Juno.
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A
TREATISE
ON THE
DISEASES OF THE EYE,
AND THEIR
REMEDIES;
TO WHICH IS PREFIXED,
THE
ANATOMY OF THE EYE;
THE
THEORY OF VISION;
And the ſeveral Species of IMPERFECT SIGHT.

Illuſtrated with COPPER PLATES.

By GEO. CHANDLER, SURGEON.

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PREFACE.

WHETHER we conſider the Eye with reſpect to its exquiſite ſtructure, its uſe in the animal oeconomy, or the pleaſures and advantages of viſion, we cannot but look upon it as one of the moſt admirable and important organs of the human frame. When we reflect likewiſe on the many painful and dangerous diſeaſes it is liable to, ariſing as well from its neceſſary uſe, as from accidental cauſes; are we not juſtified in aſſerting, that, whoever ſhall contribute towards preſerving it from injury, reſtoring it from a diſeaſed to a healthy ſtate, or remedying any of the defects of ſight, will render a ſervice by no means unacceptable or unimportant to mankind?

To be able, however, to perform any of theſe very eſſential ſervices, it muſt be allowed that an accurate knowledge of the anatomy of this wonderful organ, a clear conception of the doctrine of viſion, and a thorough acquaintance with the hiſtories of the different diſeaſes, and the moſt approved and ſucceſsful methods of cure, are indiſpenſibly neceſſary. Thoſe, however, who are converſant with the principal authors in this part of medical ſcience will, I believe, readily acknowledge, that however valuable they may have formerly been, yet ſeveral circumſtances have ſince concurred to render them much leſs uſeful.

Conſiderable improvements have been made in the Anatomical, Philoſophical, Medical, and Chirurgical parts. The Pharmaceutical remedies recommended by them, are now moſtly obſolete. Several excellent obſervations have been alſo commnnicated to the public. But theſe are ſo ſcattered in a number of different publications, as to render it equally as unpleaſant as difficult to conſult them. To ſupply former deficiencies, to collect later improvements and obſervations, and to bring the whole into one point of view, appeared worthy of ſome labour, and promiſed to be both uſeful and acceptable.

Influenced by this opinion, I publiſhed ſome time ſince a treatiſe on the Cataract, and have now endeavoured to give the public, a clear, conciſe, though, I hope, ſufficiently comprehenſive view of the Anatomical ſtructure of the Eye, the Doctrine of Viſion, the various diſeaſes affecting this noble and uſeful Organ, and the beſt adapted methods of cure.

How far I have ſucceeded muſt be determined by an indulgent and impartial Public.

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A

TREATISE

ON THE

Diſeaſes of the EYE.

PART I.

CHAP. I.

AN
ANATOMICAL DESCRIPTION
OF THE
EYE.

SECT. I.

Of the Eye in general and its Orbit.

THE eye is an organ of a globular form, compoſed of coats, and humors of a peculiar ſort, furniſhed with all ſorts of veſſels, and is ſituated below the forehead in a cavity entirely bony, called the *orbit*.

This cavity is formed by the juncture of ſeven bones: the firſt is the *os frontis*, which compoſes the ſuperior part; the ſecond, which is ſituated at the bottom of the orbit externally, is the great temporal apophyſis of the *os ſphenoides* ; there is alſo another part of the os ſphenoides which enters into the compoſition of the orbit, *viz.* the tranſverſe ſpinous proceſs, which forms the bottom and ſuperior part; the third is the *os malæ*, which forms the ſmall angle of the eye, and half of the inferior part of the cavity of the orbit; the fourth is the *os maxillare ſuperior*, which forms the other half of the inferior part; the fifth is the *os unguis*, which forms the great angle of the eye; the ſixth is the *os planum*, which forms the anterior part of the orbit behind the os unguis; and the ſeventh is a ſmall portion of the *os palati*, which makes the inferior part of the fund of the orbit.

The orbit is pierced at its bottom, by the *foramen opticum* of the os ſphenoides ; adjoining to this hole is the *foramen lacerum* or large ſlit between the tranſverſe ſpinous and orbitar proceſſes; and near this is the *ſpheno-maxillary ſlit* which is the large diſcontinuation of the external ſide of the orbit, left between the orbitar proceſſes of the ſphenoid bone, the os maxillare, malæ, and palati. The whole cavity of the orbit is lined with a membrane, which is a production,

duction, or rather a continuation of the dura mater.

The organs of ſight may be divided into two parts: the internal, which is the globe of the eye with its contents; and the external, which are thoſe parts about the globe, ſubſervient to, and encompaſſing it.

SECT. II.

Of the external Parts of the Eye.

Supercilia.

THE firſt of the external parts, are the ſupercilia or eyebrows, which are two hairy arches placed above the orbits, and which are made to bunch out, by ſome fat which is under the ſkin in that place, and likewiſe by the eminence of that part of the frontal bone, which lies under them. They ſerve to defend the eyes from too ſtrong a light, and alſo from ſweat, duſt, or inſects which might otherwiſe fall into the eye. They are drawn obliquely downwards, and at the ſame time corrugated and made to approach one another by means of the *corrugator coiteri*, which is a muſcle ariſing from the great canthus of the orbit, preciſely where the os naſi is joined to the anterior apophyſe of the os frontis, from which origin it goes obliquely upwards, and terminates in the ſkin about the middle of the eyebrows: ſome anatomiſts will not allow this to be a diſtinct muſcle, but only an oblique elongation of the frontal muſcle; others think it a portion of the orbicularis palpebrarum. From the action of theſe muſcles pulling down and corrugating the eyebrows, the eye is better defended againſt ſweat, duſt, or inſects, and the rays of light are broke and intercepted when too ſtrong, the depreſſed eyebrow forming a kind of ſhade over the eye.

The muſcles which pull up our eyebrows are the *frontales:* they ariſe by a thin broad fleſhy beginning from the upper part of the os frontis, from whence deſcending, they are inſerted into the ſkin of the eyebrows, which they muſt therefore pull upward, that none of the light may be ſtopt by them.

Palpebræ.

The palpebræ or eyelids are two veils ſtretched over the fore part of the eye, and covering it during the time of ſleep. There are two in number to each eye, the one ſuperior, the other inferior. They join at their two extremities, which are called, *canthi* or angles: that next the noſe is called the greater or internal angle, the other ſituated near the temples, the leſſer or external angle.

The eyelids are compoſed of the epidermis, cuticle, or ſcarf ſkin, the cutis or true ſkin, the membrana celluloſa, the fibres of the orbicular muſcle, a cartilaginous arch called *tarſus* to each lid, and ſeveral little glands.

The cutis is here very thin, and looſely extended over the eyelids, that it may the better accommodate itſelf to the convex figure of the eye, and that it may be moved backwards and forwards thereon with greater facility. It does not terminate at the extremity of the eyelids, but it is turned over to their inſide, by lining which, it forms their inner membrane, and is then continued backwards as far as the edge of the orbit, from whence it is reflected, and continued forwards over the whole forepart of the globe of the eye, under the name of *membrana conjunctiva* or *adnata*, and terminates in the edge of the ſclerotica, adjoining the cornea: this production of the cutis is every where covered by another of the cuticle, even where it is cloſely conjoined with the cornea.

The membrana celluloſa is here very thin, becauſe there is ſcarce any fat contained in its cellulæ. To the margin of each eyelid is attached, a ſoft, thin, broad cartilage called *tarſus*, which is convex outwardly, concave on the ſide next the eye: it is broader in its middle, than at its extremities: the tarſus of the ſuperior eyelid has about five lines in breadth, that of the inferior, two lines: the extremities on the ſide next the temples are more ſlender and narrower, than thoſe next the noſe. They ſerve to keep the eyelids equally extended over the eye, and diſpoſes them to be moved backwards and forwards without falling into wrinkles. Theſe cartilages are covered with the ſkin externally; and with the inner membrane of the eyelids internally. Upon the inner ſide next the eye, there is a range of ſmall ſebaceous glands called *ciliary glands*, or from their firſt diſcoverer, *glandulæ Meibomiæ*. They ſeparate a ſort of balſam from the blood, which they ſend to the inner edge of the eyelids, by excretory ducts which open thereon. The uſe of this balſam is to defend the edges of the eyelids from being excoriated, where they ſtrike upon one another, and to keep them from concretion in time of ſleep, as ſometimes happens, when from any diſeaſe in theſe glands, this ointment is either wanting, or has loſt its balſamic quality.

The ſkin is pierced at the edge of the eyelid, for the paſſage of ſome hairs called *cilia*, or eyelaſhes. They ſerve as a paliſadoe to preſerve and ſhade the eyes, as the eyebrows do, and to hinder any filth or flies from getting into them. Hence it is to be obſerved, that when theſe hairs are loſt, a ſymptom which frequently follows a malignant ſmall pox, and ulcerations of the edge of the eyelids, the ſight is conſiderably impaired; the true reaſon of which is, that thoſe hairs by breaking and intercepting the adventitious rays that come from the heavens, or other objects above the axis of viſion, render the inward eye more dark; whence the picture on the retina becomes more clear and diſtinct: juſt as in a camera obſcura, the picture is always the moſt diſtinct and lively, when no rays are allowed to enter it, but thoſe that come from the object forming the picture.*

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* From this we may ſee, why the ſight is commonly beſt, when thoſe hairs are black, and worſt when they are very fair or white; for as black eye-laſhes are the moſt proper for ſhading the eyes, ſo there is no light reflected from their inner ſide, which by entering the eye, might

The muſcles wherewith the eyelids are moved, are firſt, the *elevator palpebræ ſuperioris.* It ariſes from a ſmall fleſhy beginning from the bottom of the orbit, near the place where the optic nerves pierce the cranium, and paſſing over the attollens oculi, it becomes tendinous, as it marches over the bulb of the eye, whence growing ſtill broader and thinner, it is inſerted into the whole ſuperior part of the cartilage of the upper eyelid. When this muſcle acts, it lifts up the eyelid and diſcovers the eye.

The eyelids are brought together to ſhut upon the eye by another muſcle, which becauſe of

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efface or weaken the picture on the retina ; whereas white eyelaſhes reflect light copiouſly into the eye, from which this picture becomes faint and imperfect. *Monaltus* relates an account of one whoſe eyelaſhes, as well as eye brows and hair of his head were of an intenſe white, from which cauſe his ſight was obſcure during the day time, but clearer at night. This ſame perſon was taken by the Moors, who dyed his eye laſhes black; upon which his ſight was rendered immediately clearer ; but the dye being waſhed off, his ſight became obſcurer. *Dr. Ruſſell* in his natural hiſtory of Aleppo, ſays, that upon a principle of ſtrengthening the ſight, as well as ornament, it is become a general practice among the Turkiſh women to black the inſide of their eyelids, by applying a powder called *Iſmid*, and that this is ſometimes practiſed by the men, but is then regarded as foppiſh.

of its figure, is called *orbicularis.* This is a thin fleſhy muſcle, about two fingers broad, whoſe fibres do circularly environ and cover the eyelids; the fibres of this muſcle have almoſt all a common tendon ſituated transverſely between the internal angle of the eye, and the naſal apophyſe of the os maxillare: this tendon is ſlender, and appears ligamentous: it is very ſtrong at its attachment to the bone, and diminiſhes as it approaches the angle of the eyelids, where it terminates at the union of the points or extremities of the tarſi. This muſcle like the ſphincters of other parts, conſtringes the eyelids, and brings them together over the eyes; and likewiſe when it contracts with a more than common force, it preſſes the globe of the eye inwards, by which means the glandula lachrymalis is compreſſed, and the tears contained therein, are ſqueezed out in greater plenty upon the eye for moiſtening and cleanſing it, as occaſion requires.

The uſe of the eyelids, is to cover the eye, to defend it againſt ſtrong light,* and other ex-

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* That our eyes may ſuffer from ſtrong light, as well as from groſſer matter, is obvious to every one's experience, and is further confirmed by the following examples: many of Xenophon's troops were blinded by the bright light

ternal injuries, and by their quick and frequent motion, to diffuſe equally over the whole cornea, the liquor which comes from the glandula lachrymalis, by which means the eyes are continually moiſtened, waſhed, cleaned, poliſhed, and made more tranſparent, for the better tranſmitting the rays of light.

Glandula lachrymalis.

Near the leſſer angle of the eye, at the entrance of the ſuperior part of the orbit, and in a ſinus formed in the orbit itſelf for the more convenient reception of it, lies a gland, ſurrounded by fat, and of the conglomerate kind, called *glandula lachrymalis*, or *inominata*. This gland is very large, and extends from the external angle to near its middle. From this lachrymal gland in horned cattle, deſcend three, four, or more viſible ducts, which open on the

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light reflected from the ſnow, through which they were obliged to march. *Dionyſius* the tyrant of Sicily, uſed to bring forth his captives from the dark dungeon in which they were confined, into a white well lighted room, by which ſudden tranſition, they were immediately blinded. *Attilius Regulus* had his eyelids cut off by the Carthaginians, and was then expoſed to the ſun, whoſe light he could not long bear, without being blinded.

inner ſide of the conjunctiva, upon the eyelid; but they have never yet been ſeen in the human ſpecies.

The tears are exhaled partly from the arteries of the conjunctiva, and internal membrane of the eyelids, as we ſee from an imitation of nature, by injecting water; and they are in part believed to proceed from this lachrymal gland. This liquor is continually, though but in a ſmall quantity, poured out upon the eye, and by the twinkling motion of the eyelids, is equally diffuſed over the whole cornea, for the purpoſes of keeping it moiſt, clean, and tranſparent; but upon particular occaſion, when our eyes are any ways darkened, or ſuffer any pain or itching, by being long expoſed to drying winds, ſmoak, or duſt, or upon certain affections of the mind, this liquor is poured out upon the eyes in greater plenty, becauſe then the orbicular muſcle, contracts more frequently, and with a more than ordinary force, and by preſſing the globe of the eye inward, compreſſes the parts where the tears are ſecerned, and by that means forces out their contents.

Puncta lachrymalia. Saccus lachrymalis. Ductus naſalis.

In the great canthus of the eye, there are two ſmall papillæ ſtanding out, having each of them one opening, ſurrounded by callous fleſh, which are perpetually open, unleſs when convulſively cloſed, and are large enough to receive a hog's briſtle, they are called *puncta lachrymalia.* Theſe holes are in the inner ſide of the eyelids, near their edge, one in each lid: they lead to two ſmall canals, called *lachrymal canals*, which approaching one another are inſerted into a common receptacle, called *ſaccus lachrymalis.* This is a ſmall, membranous, oblong bag, ſituated in the great canthus behind the caruncula lachrymalis, and lies in a bony channel, formed by the naſal apophyſe of the os maxillare and the os unguis. From the bottom of this ſac, there goes a ſmall pipe or canal, called the *ductus naſalis*, which is nothing but a continuation of the lachrymal ſac. It deſcends a little obliquely backwards, from the naſal margin of the orbit, towards the bottom of the lateral part of the internal noſtril of the ſame ſide, where its inferior extremity opens on the ſide of the maxillary ſinus, under the lower os ſpongeoſum, nearly at that place which by a vertical line anſwers to the interſtice of the ſecond and third molaris.

Caruncula lachrymalis. Valvula ſemilunaris.

The caruncula lachrymalis is a little reddiſh maſs, ſituated in the great angle of the eye, in the middle betwixt the puncta lachrymalia, but a little nearer the noſe: being viewed with a microſcope, it appears entirely glandulous, reſembling the conglomerate ſort; a quantity of ſmall fine hairs are alſo diſcoverable, which appear beſmeared with an oily matter, more or leſs yellow. On one ſide of this little glandulous body, is a ſemilunar fold, made by the conjunctive, convex on the ſide next the noſe, concave on the ſide next the pupil, and which deſcending perpendicularly joins the eyelids; it is called *valvula ſemilunaris.*

The lachrymal juice, which is continually flowing out upon the eye, for the purpoſe of waſhing, cleanſing, and moiſtening the cornea, is determined to flow along the edge of the under eyelid to the great canthus. The mechaniſm by which this is effected, conſiſts in the following particulars. Firſt, the poſition of the eyelids is ſuch, that the angle which they make, by their conjunction at the external canthus, is much more acute than that made, at their internal canthus; and therefore, when we ſhut our eyelids, the whole of their edges do not touch one another at once, but begin firſt to touch at the external canthus, where the angle is ſmalleſt, and from thence they proceed ſucceſſively to touch one another through their whole length, till laſt of all, that they touch at the internal canthus, where the angle is greateſt. It is evident therefore, that this ſucceſſive ſhutting of the eyelids, muſt neceſſarily determine the tears which flow down the eye, till they are ſtopt by the edge of the under eyelid, to run along this edge, towards the great canthus; more eſpecially as this canthus is ſomewhat lower than the external one.

A ſecond thing which contributes to this end, is the diſpoſition of the edges of the eyelids themſelves, which when ſhut by the contraction of the orbicular muſcle, do touch one another very cloſely externally; but internally, at their inner edge, they at firſt do not at all touch, but leave a ſort of triangular furrow, on the inner edge of the under eyelid, along which the tears are preſſed by the further contraction of the orbicular muſcle, which by preſſing the eyelids together with much force, obliterates this furrow, firſt towards the external angle, and thence ſucceſſively to the internal angle, which laſt of all, is effaced. Theſe are the cauſes, which determine the tears to run along the edge of the eyelids to the great canthus, and the reaſons why any particle of ſand or dirt getting into the eye, is thereby ſoon carried to that place.

By means of this mechaniſm, the lachrymal juice, together with the duſt and filth waſhed off the cornea, is tranſmitted to the greater canthus, where is a ſmall cavity formed for their reception; for in this angle is placed the caruncula lachrymalis, which by its protuberancy hinders the inner ſurfaces of the eyelids from applying themſelves cloſely to the ſubjacent parts; and therefore there is a ſmall void ſpace preſerved at the baſis of this caruncle, into which the tears are collected.

The uſe therefore of this caruncle is. Firſt, to form and preſerve a ſmall cavity in the great canthus for the reception of the lachrymal juice. Secondly, to hinder this juice from running out upon the face at the great canthus, which it would do, were it not ſtopt by this caruncle; for the eyelids when ſhut, do but ſlightly touch one another, at their conjunction in this angle. Thirdly, to keep the puncta lacrymalia open, which otherwiſe would be ſtopt, by having their orifices applied to the ſubjacent parts; for this caruncle, as was ſaid before, by it protuberancy,

berancy, forms a ſmall empty ſpace at its baſis, into which the tears are collected; it is into this cavity, the mouths of the puncta lachrymalia gape, which muſt therefore receive the tears contained therein, and tranſmit them to the ſaccus lachrymalis, from which they are carried by the ductus naſalis, into the cavity of the noſe.

When the quantity of lachrymal juice is ſo great, as that all of it cannot paſs by the puncta, as frequently happens upon any violent paſſion of the mind, ſuch as grief, anger, joy, &c. or from irritating particles getting into the eye, then it flows down the cheeks in form of tears.

Muſcles of the eye.

The motions of the eye are performed by means of ſix muſcles, whereof four are ſtrait, and two oblique.

The firſt of the four ſtrait muſcles is ſituated upon the ſuperior part of the globe upon which it lies. It pulls up the eye when we look up, and is therefore called *attollens*. The ſecond is directly oppoſite to the attollens, and is ſituated upon the under part of the eye, which it pulls down, and is therefore called *deprimens.* The third and fourth are at the ſides of the eye, and draw it towards the noſe, or from it towards the little angle: that which draws it towards the noſe is called *adductor*; that which pulls it from the noſe towards the little angle, *abductor.* Theſe muſcles are attached by their poſterior extremities in the bottom of the orbit, near to the optic foramen, to the production of the dura mater by ſhort and narrow tendons; from thence they go fleſhy towards the great circumference of the convexity of the globe, between the optic nerve and the cornea tranſparens, where they widen by very flat tendons, and ſo broad that they touch one another, and afterwards unite. Theſe tendons attach themſelves at firſt by a particular inſertion to the circumference juſt ſpoken of, and after that continue their adherence even to the cornea, forming the *tunica albuginea*, is nothing elſe but the tendinous expanſions of the four ſtrait muſcles of the eye.

When the four ſtrait muſcles act ſeparately, they muſt of courſe elevate, depreſs, or turn the globe of the eye, either to the noſe or to the temple. But when the attollens and adductor, or abductor, or when the deprimens and adductor or abductor act together, they perform the oblique motions, which have been attributed to the oblique muſcles. When they act ſucceſſively, they give the globe a rotatory motion; and when all four act together, they draw the whole eye inwards, towards the bottom of the orbit.

The oblique muſcles of the eye are two in number, whereof one is called *obliquus major* or *inferior*, or *trochlearis*, the other *obliquus minor* or *inferior.*

The obliquus ſuperior is attached by a narrow tendon at the bottom of the orbit, between the attollens and adductor, from whence it runs obliquely by the ſide of the orbit, oppoſite the interval of theſe two muſcles, towards the internal angular apophyſe of the os frontis; at this place it terminates by a ſlender tendon, which paſſes through a kind of cartilaginous ring or trochlea affixed to the os frontis, and is afterwards reflected backwards and downwards, being included in a capſule of its own, and at laſt is inſerted into the globe, a little poſteriorly and laterally towards the noſe.

The obliquus inferior is ſituated obliquely at the lower part of the orbit under the deprimens, and is attached by one extremity, a little tendinous, to the root of the naſal apophyſe of the os maxillare, towards the edge of the orbit between the opening of the naſal duct, and the inferior orbitary fiſſure; from thence it paſſes obliquely, and a little tranſverſely backwards under the deprimens, and goes to attach itſelf to the lateral poſterior part of the globe, by a flat tendon oppoſite, and at a little diſtance from the tendon of the obliquus ſuperior or trochlearis.

When the obliquus ſuperior acts it draws the eye forwards, and turns its pupil downwards.

When the inferior oblique acts it brings the eye forwards, and directs the pupil upward.

The ſpherical figure of our eyes, and their looſe connection to the edge of the orbit by the tunica conjunctiva, which is ſoft, flexible and yielding, does excellently diſpoſe them to be moved this or the other way, according to the ſituation of the object we would view; and beſides, there is a great deal of fat placed all round the globe betwixt it and the orbit, which lubricates and ſoftens the eye, and renders its motions more eaſy.

SECT. III.

Of the Globe of the Eye with its Contents.

THE globe of the eye, if the protuberance of the cornea be excepted, is almoſt perfectly globular; nevertheleſs, it is ſomewhat compreſſed anteriorly, and is rather longer than it is broad: it begins from a conſiderable nerve called the optic nerve, and is formed principally by three tunics or coats, and three humors contained in thoſe coats: the firſt or external coat is called the *ſclerotica*, the ſecond *choroides*, and the third *retina*: the humors beginning at the forepart of the eye, are the *aqueous*, the *chryſtalline*, and the *vitreous*. We will deſcribe theſe parts in the order here mentioned.

Optic Nerves.

The optic nerves ariſe from the thalami nervorum opticorum, and then after making a large curve outwards, run obliquely inwards and forwards till they unite at the forepart of the ſella turcica, and then dividing again, each runs obliquely forwards and outwards to go out at its proper hole in the ſphenoidal bone, to run afterwards to the globe of the eye into which it is inſerted, not in the middle, but a little nearer to the noſe.

During the paſſage of the optic nerves out of the cranium, they receive a covering from the dura mater, and at the internal edge of the foramen opticum, the dura mater is divided into two lamina, one of which adhering to the bones, forms the perioſteum of the orbit, and the other cloſely embraces the nerve like a ſheath, and is continued with it to the globe of the eye.

Sclerotica. Cornea tranſparens.

The *ſclerotica* or *cornea opaca*, as it is ſometimes called, is compoſed of ſeveral plates cloſely joined together; its ſubſtance is very hard and compact, reſembling a kind of parchment; it is very thick while contiguous to the optic nerve, but gradually diminiſhes in thickneſs as it advances forwards. It is of a globular figure, and to the forepart of this globe, pierced with a circular hole, is prefixt obliquely a portion of a more convex or leſs ſphere, pellucid and made up of many ſcales or plates, more evidently diſtinct than thoſe of the ſclerotica, and between which is lodged an exceedingly tranſparent liquor: this is called *cornea* *tranſparens*, or imply the *cornea*, and is the part through which the light paſſes to the internal parts of the eye.

Choroides.

The choroides is a ſoft, tender coat, compoſed of innumerable veſſels, and which being concentrically expanded within the ſclerotica from the inſertion of the optic nerve to the origin of the cornea, lines its internal ſurface, with which it is connected, by means of cellular membrane and many veſſels. The choroides is outwardly of a brown colour, but inwardly of a much deeper brown; almoſt black. *Ruyſch* ſays the choroid is compoſed of two diſtinct membranes, the internal of which he calls *tunica ruyſchiana*, and the other choroides. When this coat is arrived at the circumference of the cornea tranſparens, it is attached ſtrongly by means of a good deal of cellular membrane, to the ſclerotica at the place of its union with the tranſparent cornea, thereby forming a kind of white, circular, and narrow band called *orbiculus ciliaris*; from thence it changes its direction, and goes directly inwards towards the axis of the eye; it is then no longer called choroides, but the anterior ſurface, which is of various colours in various perſons is called *iris*; the poſterior ſurface, which is covered with a black pigment, *uvea*, and the round hole obſervable in the middle of it, the *pupil.*

Behind the uvea are obſerveable ſhort, oblong, white fibres, ariſing by fine pale lines or ſtreaks, ſcarce perceptible, from the inſide of the choroides near the orbiculus ciliaris, and which becoming gradually thicker, whiter and cloſer, run over the forepart of the vitreous humor, where they are received into ſlight depreſſions or furrows, to which they are ſtrongly adherent, and terminate at the margin of the chryſtalline lens: theſe are called *ciliary ligaments* or *proceſſes*, and their interſpaces are every where filled up with a black pigment, ſuch as beſmears the internal ſurface of the choroides, and back of the uvea.

The choroides is quite opake in all its parts; by which means it allows no light to paſs but what enters by that circular hole in its forepart called the pupil: and this opacity is yet more encreaſed by a black pigment with which it is all over covered, and which makes this membrane appear black, though it be really white, as any body may be aſſured of by ſcraping and waſhing off this colour which eaſily ſeparates.

The pupil has no fixed meaſure, being greater or ſmaller according as more or leſs light ſhines upon the eye. When the light is ſtrong, or the viſual object too luminous, we contract the pupil for intercepting a part of the light, which would otherwiſe dazzle and hurt our eyes; but when our eyes are in no danger of being hurt by the light, and eſpecially if the light is ſo weak as to make but a faint obſcure picture on the retina, we enlarge this aperture that more light may enter the eye for making a ſufficient impreſſion on this membrane. This aperture alſo contracts at the near approach of any ſmall object when we endeavour to view it diſtinctly [*]. In a fœtal ſtate, the place of the pupil is entirely occupied by a thin vaſcular membrane called *membrana pupillaris*, ſo that the iris appears imperforate; but this appearance vaniſhes before the birth.

Retina.

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[*] From this power of contraction and dilatation, many anatomiſts have attributed muſcular fibres to the iris, and have even ſpoke of its having two ſets of muſcular fibres; one longitudinal, for the purpoſe of enlarging the pupil, the other, orbicular, which operates like a ſphincter, and contracts the pupil. But *Morgagni* aſſerts that he never could, even with the aſſiſtance of glaſſes, perceive any muſcular fibres. *Haller* is ſo ſilent concerning any muſcles belonging to the iris, that he attributes the dilatation and conſtriction of the pupil, ſolely to the weaker or ſtronger aflux of humours into the veſſels of the iris. *Zinn* alſo thinks it impoſſible, with the beſt microſcope, to diſcover any muſ-

cular

Retina.

Immediately under the choroides lies the third and laſt membrane of the eye, called *retina*, which is a fine expanſion of the medullary part of the optic nerve. It is whitiſh, ſoft, and tender; immediately embraces the vitreous humour, and extends from the inſertion of the optic nerve to the extremities of the ciliary proceſſes.

Theſe coats of the eye include its humors, which are three tranſparent ſubſtances, the one a ſolid, the other a ſoft body, and the third truly a liquor. They are called the *aqueous*, the *chryſtalline*, and the *vitreous*.

Aqueous humor.

The aqueous humor is a liquor very limpid and liquid, and fills up the ſpace which is between the cornea tranſparens and the iris, and the ſpace between the uvea and the chryſtalline, as well as the hole of the pupil. Theſe two ſpaces are called by the name of *chambers*, and are relating to their ſituation, divided into an-

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cular fibres. He however adds, that from the phenomena, and ſtructure of the iris, and alſo from analogy, he is almoſt inclined to think that it muſt have muſcular fibres intermixt with the veſſels and nerves on the anterior face of the iris.

terior and poſterior. Theſe two chambers of the aqueous humor are of different extent: the anterior, which is between the cornea tranſparens and the iris, is the greateſt of the two: the poſterior, which lies hid between the uvea and the chryſtalline, is very narrow, eſpecially towards the pupil, where the uvea almoſt touches the chryſtalline. This humor is imagined to be exhaled from the ſmall arteries of the iris, uvea and ciliary proceſſes, and to be again abſorbed into ſmall veins of the ſame parts, while ſome portion is imbibed and exhaled through the cornea; when it has eſcaped through a wound of the cornea, and the cornea has thereby become flaccid, in a few days, it again becomes plump from a freſh ſupply of this humor.

Chryſtalline.

The ſecond humor of the eye, is called the chryſtalline, becauſe it reſembles the pureſt chryſtal in tranſparency *. Its ſubſtance is by much the moſt firm and hard of any of the humors, and is made up of many thin ſpherical lamina or plates lying within each other, like the different pellicles or plates which compoſe an onion. It is not throughout of the ſame conſiſtence, being outwardly like a thick jelly, but towards the center as conſiſtent as hard ſuet. It is of a lenticular figure, being convex on both ſides; but its forepart which regards the pupil, is not ſo convex as its poſterior ſide next the vitreous humor. The whole of it is contained in a firm, elaſtic, thick, tranſparent coat or capſule, called *tunica aranea*, the anterior part of which is thicker, ſtronger, and denſer than the poſterior. This capſule has always a little water contained between it and the chryſtalline. Into the anterior part of this capſule, a little beyond the great circumference of the chryſtaline, is inſerted the membrane of *Petits canal*, as will be ſeen in the deſcription of the vitreous humor: The chryſtaline humor is ſituated exactly behind the pupil, not in the middle of the eye, but a good deal nearer its fore than its back part: its axis coincides with the axis of the eye. The aqueous humor fills up all the diſtance betwixt it, and the cornea, as the vitreous does that, betwixt it and the retina. We have ſaid that this humor is convex upon both ſides, and that its back part is the moſt convex. Now this convexity of its poſterior face is all received into an equal concavity in the ſore part of the vitreous or glaſſy humor.

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* The chryſtalline humor is altogether colorleſs till about the age of 30, at which time it begins to contract a yellowneſs which afterwards gradually encreaſes, ſo that at the age of 70 or 80, it is of the colour of amber: it nevertheleſs does not loſe its tranſparency.

Vitreous humor.

The third humor of the eye is the vitreous, which is of a middle conſiſtence betwixt that of the aqueous and chryſtalline humors. It is the largeſt of all the humors of the eye, and fills the whole back part of the globe, from the chryſtalline and ciliary ligaments to the retina. The middle of its fore part has a ſmall cavity in which the whole poſterior face of the chryſtalline lies. This humor, as well as the chryſtalline, has a very fine coat which covers it all round, and is called *tunica vitrea.* The fabric of the vitreous humor is cellular, its ſubſtance being divided by a very fine tranſparent membrane into cellules or little membranous compartments, containing a very tranſparent liquor. In the ſame plane where the ciliary ligaments are produced from the choroides, there ariſes a little membrane or girdle from the tunica vitrea, immediately detached from, although contiguous to it, which paſſing between the vitreous humor, and the ciliary ligaments, gradually recedes more and more from the vitreous humor, as it approaches nearer to the chryſtalline humor, and is at laſt inſerted into the capſule of the chryſtalline, at its anterior convexity, juſt beyond its great circumference; ſo that by this means, a ſmall, triangular, curvelined ſpace, is left between the vitreous body and this membrane: this ring is interrupted by ſeveral little diviſions, occaſioned by ſtrong, tranſverſe, ſhort fibres, which running over the membrane, bind and contract it, at intervals. *Petit* was the firſt diſcoverer of this ring, and borrowing a word from the goldſmiths, he called it in French, *canal godronnè*; but in books of anatomy, it is, for the moſt part, called from its diſcoverer, *canalis Petitianus* *.

SECT. IV.

Blood veſſels of the Eye, and its Appurtenances.

THE external carotid artery, by means of the external maxillary, temporal and frontal arteries, give a great many branches to the teguments which ſurround the eye, and to all the portions of the orbicular muſcles; which branches communicate with thoſe that are diſtributed to the membrana conjunctiva of the eyelids, and to the caruncula lachrymalis.

The ſame external carotid, by means of its branch, the internal maxillary artery, ſends a conſiderable branch into the orbit, through the inferior orbitary or ſpheno-maxillary fiſſure, which is diſtributed to the perioſteum of the orbit, to the muſcles of the globe of the eye, to the levator palpebræ ſuperioris, to the fat, glandula lachrymalis, membrana conjunctiva, caruncula lachrymalis, &c. It communicates with the internal carotid, and ſends off a ſmall artery which goes to the ethmoidal cells of the noſe, through the little internal poſterior orbitary hole.

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* See Zinn, Deſcrip. anatom. ocul. hum. p. 123, 4.

The internal carotid artery having entered the cranium, ſends off ſmall branches, which accompany the optic nerve, and the nerves which paſs through the ſpheno-maxillary fiſſure. One of theſe ſmall arterial branches inſinuates itſelf into the ſubſtance of the optic nerve, and produces on the retina thoſe ſmall arteries, which are ſeen pretty diſtinctly on the inner ſides of that membrane. The others join the ſmall ramifications of the external carotid already mentioned, and having penetrated into the ſubſtance of the ſclerotica, on its poſterior part, and run for a little way onwards in its ſubſtance, they pierce it internally in four or five places, at nearly an equal diſtance between the optic nerve and the pupil; and afterwards pierce in as many places, the external lamina of the choroides, and form between that, and the internal lamina, the *vaſa vorticoſa* of *Steno*, ſo called from their vortical direction. There are alſo obſervable ſome ſmall vaſcular filaments, adhering very cloſely to the tunica vitrea; theſe ſame little arterial branches, before they form the vaſa vorticoſa, ſend, in nearly a direct courſe, ſmall arteries to the circumference of the uvea, which form in its ſubſtance a ſort of vaſcular circle, from whence capillary branches go off as far as the membrane of the chryſtalline.

The veins of all theſe parts anſwer nearly to the arteries. The internal veins empty themſelves partly into the internal jugular veins, by the orbitary, cavernous, and petrous ſinuſſes, and partly into the external jugular vein, by the external maxillary, internal maxillary, temporal veins, &c. Beſides the capillary veſſels, eaſily diſtinguiſhable by the red colour of the blood, there are great numbers of thoſe which admit only the ſerous and lymphatic parts of the blood, and conſequently do not appear while in their natural ſtate. They become viſible in ſome places by inflammations and injections; as on the membrana conjunctiva.

SECT. V.

The Nerves of the Eye, and its Appurtenances.

BESIDES the optic nerve already deſcribed, the globe of the eye receives ſeveral ſmall nerves, which creep on each ſide, along and about the optic nerve from its entrance into the orbit, to its inſertion in the globe. Theſe filaments come principally from a ſmall lenticular ganglion, formed by very ſhort branches of the orbitary or opthalmic branch of the fifth pair, and by a branch of the third pair or motores oculorum. Theſe nervous filaments of the ſmall lenticular ganglion having reached the globe of the eye, divided into five or ſix faſciculi, which ſurround the optic nerve, and afterwards piercing the ſclerotica, they run between that and the choroides towards the iris, where being divided into ſeveral ſhort filaments, they terminate in its ſubſtance.

The nerves which go to the other parts belonging to the eye, come from the third, fourth, ſixth and two firſt branches of the fifth pair of nerves of the medulla oblongata, and likewiſe from the portio dura of the ſeventh pair. The third, fourth, and ſixth pairs give nerves to the muſcles of the globe of the eye. The two branches of the fifth pair, and the portio dura of the ſeventh give nerves not only to the other parts which ſurround the globe, but alſo to the frontal muſcles and internal parts of the noſe.

The trunk of the third pair having entered the orbit, through the ſuperior orbitary or ſphenoidal fiſſure, produces four branches. The firſt runs upward and divides into two; one for the attollens muſcle, and the other for the levator palpebræ ſuperioris. The trunk continuing its courſe, gives off the ſecond ſhort branch to the deprimens. The third branch is long, and goes to the obliquus inferior, contributing likewiſe to the formation of the lenticular ganglion before mentioned. The fourth branch is large, and goes to the adductor muſcle.

The firſt branch of the fifth pair, commonly called the opthalmic branch, paſſes through the foramen lacerum into the orbit, and then divides into three branches; one ſuperior called the frontal or ſuperciliary branch; another internal, called the naſal branch, and the third external, called temporal or lachrymal.

The frontal or ſuperciliary branch runs all along the perioſteum of the orbit, and having paſſed through the ſuperciliary notch or foramen of the os frontis, is diſtributed to the frontal, corrugator coiteri, and ſuperior portion of the orbicularis palpebrarum muſcles; and it communicates with a branch of the portio dura of the ſeventh pair.

The naſal branch paſſes under the ramification of the nerve of the third pair, and running to the ſide of the noſe is diſtributed thereto, and to the neighbouring part of the orbicularis, caruncula lachrymalis, &c. This branch ſends off a filament, which paſſing through the internal, anterior, orbitary hole, enters the cranium, and preſently returns again through one of the ethmoidal holes, to the internal parts of the noſe.

The temporal branch which is ſometimes a ſubdiviſion of the ſuperciliary, is diſtributed to the glandula lachrymalis, and ſends off a filament, which pierces the orbitary apophyſis of the os malæ.

The ſecond branch of the fifth pair, called the ſuperior maxillary, ſends off a twig through the bony canal of the lower part of the orbit, which going out at the anterior, inferior, orbitary hole, is diſtributed to the neighbouring portion of the orbicularis, and communicates with a branch of the portio dura.

The portio dura of the ſeventh pair or auditory nerve, gives branches to the ſuperior, inferior and external lateral parts of the orbicularis palpebrarum, one of which communicates with the frontal, and another with the ſuborbitary nerve.

CHAP. II.

THEORY OF VISION.

SECT. I.

Of the Nature and Properties of Light.

LIGHT is ſaid to conſiſt of matter infinitely ſmall, lodged originally in the great body of the ſun, and from thence tranſmitted in radiated lines, with an incredible velocity (it moving at the rate of ten millions of miles in a minute) which falling upon the external ſurfaces of objects, and being from thence reflected into the eye, renders them apparent, and is thus the *material cauſe* of viſion.

The light in paſſing out of air into any tranſparent body, does not perſiſt in the ſame direction it had before its entrance, but is inflected or turned inwards. For example, let A, B, C, D, fig. 1. repreſent a portion of water, or glaſs, A, B, the ſurface of it, upon which the ray of light E, F, falls obliquely; this ray ſhall not go right on in the courſe delineated by the line F, G, but be turned off from the ſurface A, B, into the line F, H, leſs inclined to the ſurface A, B, than the line E, F, is, in which the ray is incident upon that ſurface. On the other hand, when the light paſſes out of any ſuch body into the air, it is inflected the contrary way, being after its emergence rendered more oblique to the ſurface it paſſes through, than before. Thus the ray F, H, when it goes out of the ſurface C, D, will be turned up towards that ſurface, going out into the air in the line H, I.

This turning of the light out of its way, as it paſſes from one tranſparent body into another, is called its *refraction*. Both theſe caſes may be tried by an eaſy experiment with a baſon and water. For the firſt caſe ſet an empty baſon in the ſunſhine or near a candle, making a mark upon the bottom at the extremity of the ſhadow caſt by the brim of the baſon, then by pouring water into the baſon, you will obſerve the ſhadow to ſhrink, and leave the bottom of the baſon enlightened to a good diſtance from the mark. Let A, B, C, fig. 2. denote the empty baſon, E, A, D, E, A, D, the light ſhining over the brim of it; ſo that all the part A, B, D, be ſhaded. Then a mark being made at D, if water be poured into the baſon, (as in fig. 3.) to F, G, you ſhall obſerve the light, which before went on to D, now to come much ſhort of the mark D, falling on the bottom in the point H, and leaving the mark D a good way within the enlightened part; which ſhews that the ray E, A, when it enters the water at I, goes no longer ſtraight forwards, but is at that place incurvated, and made to go nearer the perpendicular. The other caſe may be tried by putting any ſmall body into an empty baſon, placed lower than your eye, and then receding from the baſon, till you can but juſt ſee the body over the brim. After which, if the baſon be filled with water, you ſhall preſently obſerve the body to be viſible, though you go farther off from the baſon. Let A, B, C, fig. 4. denote the baſon as before, D the body in it, E the place of your eye, when the body is ſeen juſt over the edge A, while the baſon is empty. If it be then filled with water, you will obſerve the body ſtill to be viſible, though you take your eye farther off. Suppoſe you ſee the body in this caſe juſt over the brim A, when your eye is at F, it is plain that the rays of light, which come from the body to your eye, have not come ſtraight on, but are bent at A, being turned downwards, and more inclined to the ſurface of the water, between A and your eye at F, than they are between A and the body D.

It is by means of this power of refraction, that a ray of light let through a ſmall hole of a window ſhut in a darkened room, and tranſmitted through two ſurfaces of a priſm, will, on a white paper held at a proper diſtance from the priſm, exhibit an image made up of the following colours, and in this order, viz. red, orange, yellow, green, blue, indigo, violet. For the light is not a ſimple homogeneal body, but compoſed of heterogeneal and diſſimilar rays, which in like incidences, are endued with different degrees of refrangibility. By this property in them, in the paſſage of the light through the priſm, every ſimple ray undergoes that degree of refraction which is peculiar to itſelf, and as every ray has a different degree of refrangibility, ſome more, and ſome leſs, they will take different directions, and of courſe be ſeparated one from another, and thus decompounded, will put on the appearance of red, blue, &c. which when all blended together, gave that appearance of whiteneſs, under which we ſee the rays of light, before they undergo this experiment. If we place a convex glaſs between the paper and the priſm, it will collect the rays together, which were ſeparated by the priſm, and thus blending and incorporating them, the image repreſented upon a paper placed at the focus of the convex lens (or that ſpot where the rays are all converged to a point) will be white, but if the paper be nearer the glaſs than the focal diſtance, it will have painted on it the different colours, in a more vivid or fainter degree, as the paper recedes or advances to the focal diſtance, as the rays though converged and tending to one another immediately after their paſſage through the glaſs, yet are not intimately united till arrived at the focus.

Another property of light is, its reflexibility or its diſpoſition to be turned back into the ſame medium, by any other medium upon whoſe ſurface it falls. And in this it obſerves the ſame law that other bodies do in their reflexions, viz. the angle of reflection is always equal to the angle of incidence. For example, let B, fig. 5. repreſent a hole in a window ſhut, A, B, C, a beam of the ſun's light falling on a looking glaſs G, C, F, at C. This beam ſhall after its incidence at C, be reflected back in the line C, D.

From the looking glaſs at the point of incidence C, raiſe the perpendicular C, E; the angle A, C, E, which the incident beam A, C makes with the perpendicular C, E, is the angle of incidence; and the angle D, C, E, which the reflected beam C, D, makes with the ſame perpendicular C, E, is the angle of reflection. Now theſe angles upon meaſuring them, are always found equal.

Having ſeen that the light is compounded of rays of many different colours, and that more or leſs is always reflected from the ſurface of objects, wherever it happens to fall, we ſhall readily conceive why bodies appear in open day light of ſuch different colours, which is owing to nothing more, than ſuch a conſtitution of the particles of an object, as diſpoſes it to reflect the rays of one colour in greater abundance than the rays of any other.

As nothing more is required to make bodies look white, than a power to reflect indifferently rays of every colour, ſo blackneſs is produced by a ſuffocation and abſorption of the incident light, which being ſtopped and ſuppreſſed in the black body, is not reflected outward, but enters the body, and is often reflected and refracted within the body, until it be ſtifled and loſt.

It is the irregular reflections and refractions of light through the ſubſtance of bodies, owing to their pores being numerous and large, which renders bodies opake, as on the contrary, their tranſparency ariſes from the light being tranſmitted through them in right lined directions, which is the caſe whenever the particles lie contiguous one to another, and no interſtices occur to diſturb the ſtraight lined tranſmiſſion of them.

It will be underſtood from what has been ſaid above, that when light falls upon the ſurface of glaſs obliquely, after its entrance into the glaſs, it is more inclined to the line drawn through the point of incidence perpendicular to that ſurface, than before. Suppoſe a ray of light iſſuing from the point A, fig. 6. falls on a piece of glaſs B, C, D, E, whoſe ſurface B, C, whereon the ray falls, is of a ſpherical or globular figure, the center whereof is F. Let the ray proceed in the line A, G, falling on the ſurface B, C, in the point G, and draw F, G, H. Here the ray after its entrance into the glaſs will paſs on in ſome line, as G, I, more inclined toward the line F, G, H, than the line A, G, is inclined thereto; for the line F, G, H, is perpendicular to the ſurface B, C, in the point G. By this means, if a number of rays proceeding from any one point, fall on a convex ſpherical ſurface of glaſs, they ſhall be inflected (as is repreſented in fig. 7.) ſo as to be gathered pretty cloſe together about the line drawn through the center of the glaſs from the point, whence the rays proceed: which line is called the axis of the glaſs.

If the light fall on a concave ſpherical ſurface, after refraction it ſhall ſpread quicker than before, as in fig. 8. unleſs the rays proceed from a point between the center, and the ſurface of the glaſs.

The rays, which ſpread themſelves from a point, are called *diverging*; and ſuch as move toward a point, are called *converging* rays. And the point in the axis of the glaſs, about which the rays gather after refraction, is called the *focus* of thoſe rays.

SECT. II.

How Viſion is performed.

WHEREVER the rays which come from all the points of any object meet again in ſo many

Fig. 1.

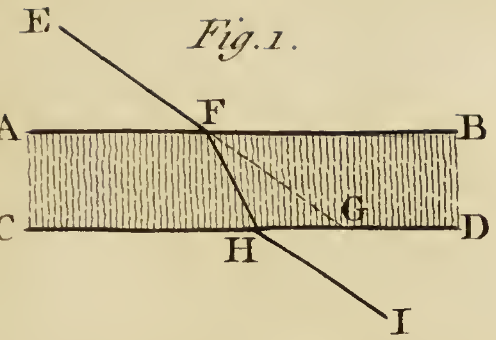
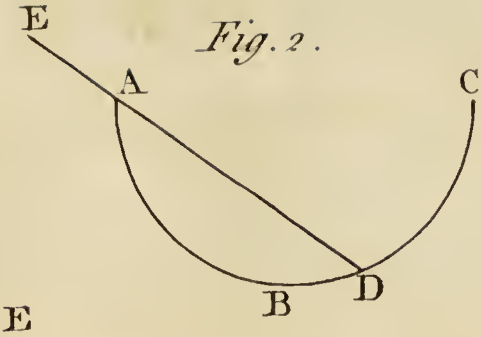


Fig. 2.



ig. 3.

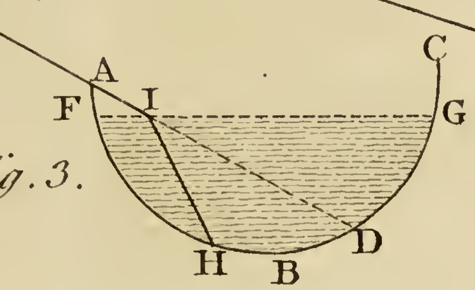


Fig. 4.

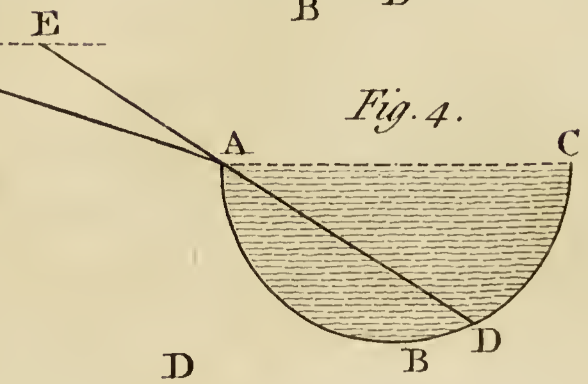


Fig. 5.

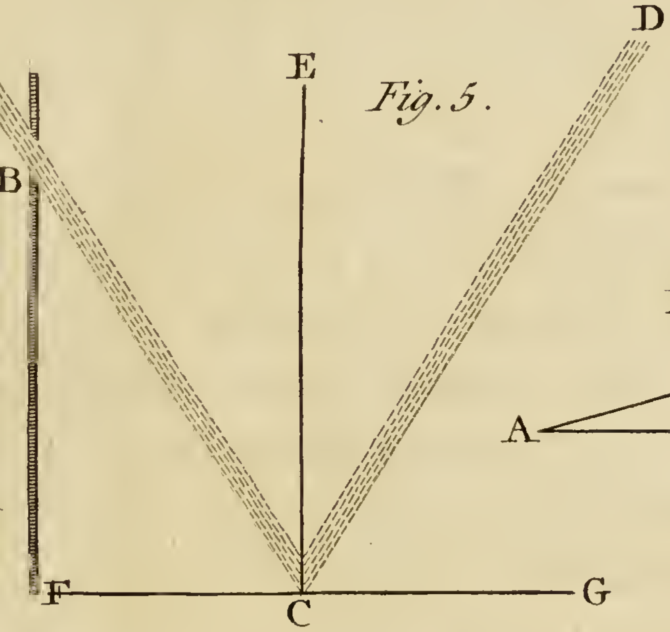
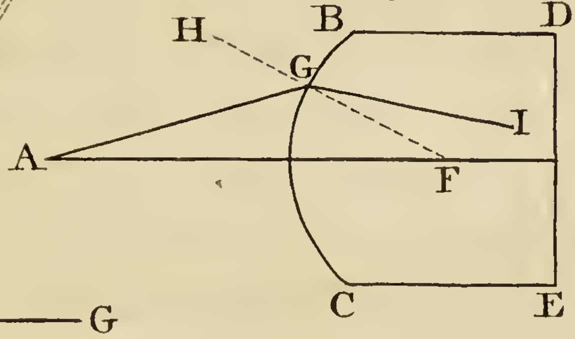


Fig. 6.



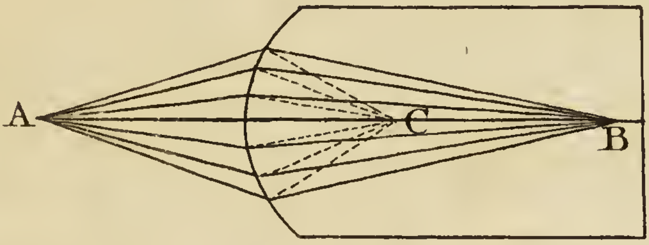
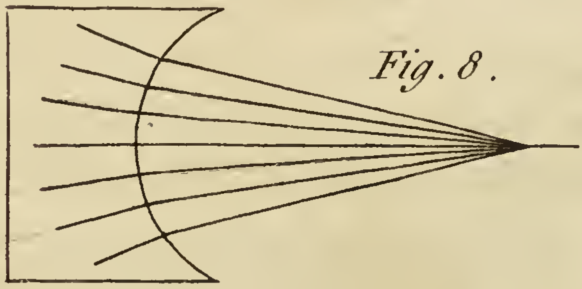


Fig. 7.

Fig. 8.



many points, after they have been made to converge by refraction, there they will make a picture of the object upon any white body on which they fall.

Demonſtration. Let P, R, fig. 1. plate 2. repreſent any object without doors, and A, B, be a lens placed at a hole in the window ſhut of a dark chamber, whereby the rays that come from any point Q of that object are, by the refractive power of the glaſs, turned out of their ſtraight courſe, and made to converge and meet again in the point *q*; if a ſheet of white paper be held at *q* for the light there to fall upon it, the picture of that object P, R, will appear upon the paper in its proper ſhape and colours. For as the light which comes from the point Q, goes to the point *q*; ſo the light which comes from the other points P, and R, of the object will go to ſo many other correſpondent points *p*, and *r*, (as is manifeſt from the laws of refraction above explained.) So that every point of the object ſhall illuminate a correſpondent point of the picture, and thereby make a picture like the object in ſhape and colour, this only excepted, that the picture ſhall be inverted. And this is the reaſon of that vulgar experiment of caſting the ſpecies of objects from abroad, upon a wall or ſheet of white paper in a dark room;

which is therefore an experimental proof of the truth of the above mentioned aſſertion.

Now this repreſentation of objects upon a ſheet of white paper, by means of a lens placed at a hole in the window ſhut of a dark room, is perfectly ſimilar to what happens in our eyes when we view objects; for viſion, in ſo far as our eyes are concerned, conſiſts in nothing but ſuch a refraction of the rays of light by the tranſparent ſkins and humors of the eye, as is neceſſary to unite and bring together the rays which come from the ſeveral points of the object in ſo many correſponding points in the bottom of the eye, and there to paint the picture of the object upon the Tunica Retina, with which the bottom of the eye is covered; which picture being propagated by motion along the fibres of the optic nerve into the brain, is the cauſe of viſion: For accordingly as theſe pictures are perfect or imperfect, the object is ſeen perfectly or imperfectly.

Thus in general viſion is performed. But, in order to underſtand how the ſeveral humours of the eye conduce to the forming of this image or picture, ſee fig. 2, where Z is the eye, and B *t*, B *s*, B *u*, &c. are rays coming to the eye from the point B, of the object A, B, C, placed at a convenient diſtance before the eye; of theſe rays it is obvious, that the middle one B*t* being in the axis of viſion, muſt fall perpendicularly upon all the humors of the eye, as it paſſes through them to the *retina*, and conſequently muſt move ſtraight forward to *b* in the bottom of the eye, without ſuffering any refraction: but the other rays as B*s*, B*u*, &c. by falling obliquely upon the tranſparent cornea, which being of equal denſity with the aqueous humor, muſt have the ſame refractive power; I ſay, theſe other rays, by falling obliquely on the cornea, which is denſer than the medium of air through which they paſſed, will be refracted towards the perpendicular; let therefore *h*, *p*, and *h*, *p*, be drawn perpendicular to the cornea, at the points of incidence *s*, and *u*; it is evident, that theſe rays, by being refracted towards theſe perpendiculars, will be made to approach one another, becauſe the perpendiculars themſelves do ſo; and this is the firſt refraction which the rays ſuffer in falling upon our eyes, by which they are brought nearer to one another, that more of them may paſs through the pupil, and may not be loſt upon the uvea.

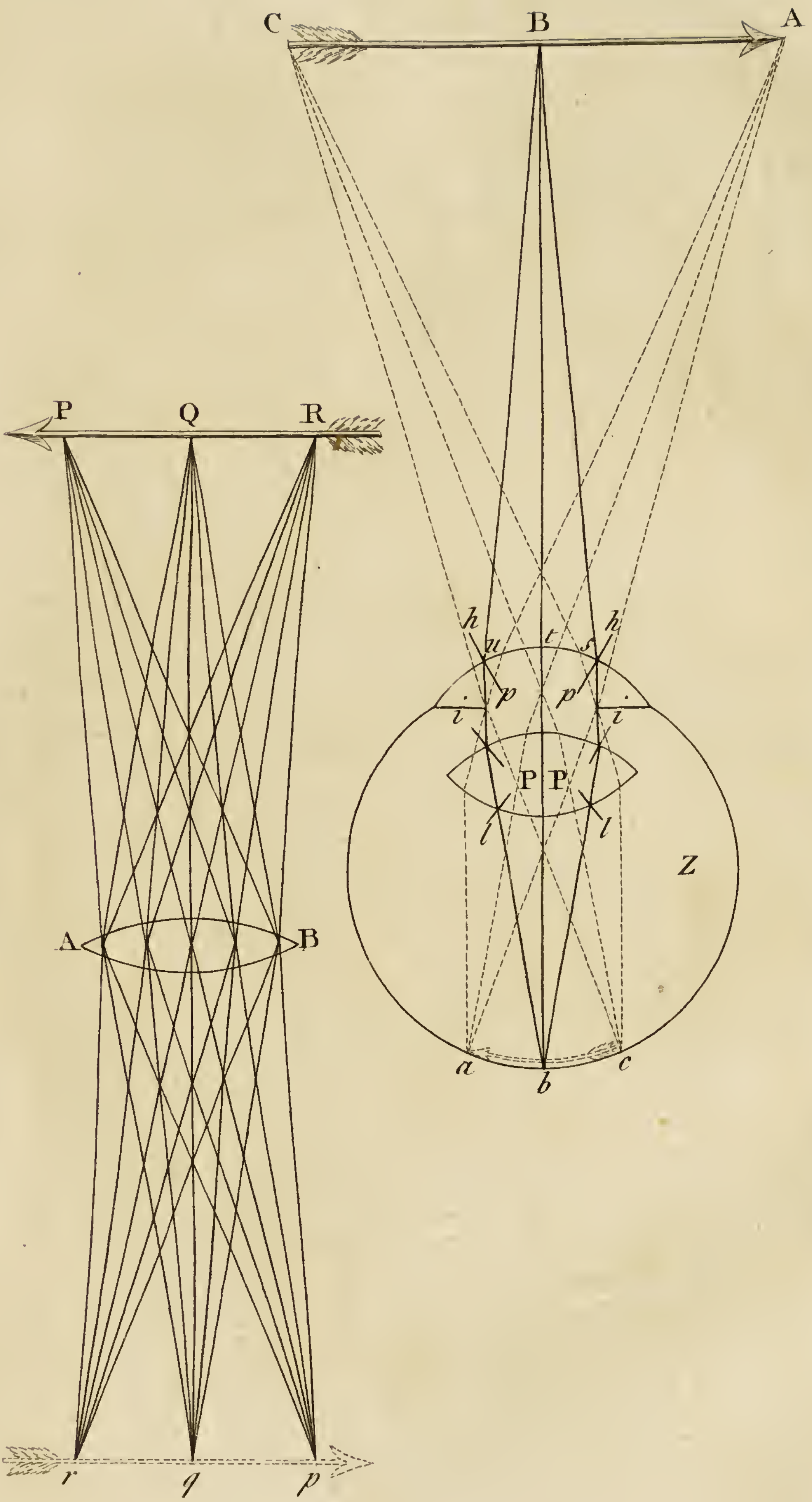
A ſecond refraction which thoſe rays ſuffer, is in paſſing out of the aqueous humor into the chryſtalline; by which refraction they are made to approach ſtill more to one another than before; for the chryſtalline being denſer than the aqueous humor, the rays here alſo muſt be refracted towards the perpendiculars *i*, P, *i*, P; but theſe perpendiculars, becauſe of the convex circular ſurface of the chryſtalline, do approach one another; and therefore the rays, which by refraction are turned out of their ſtraight courſe, and made to move towards theſe perpendiculars, muſt alſo approach one another, and become more convergent: and this is the ſecond refraction which the rays ſuffer in moving through the tranſparent humors of the eye.

But there is yet a third refraction which the rays ſuffer in paſſing out of the chryſtalline into the vitreous humor; for the chryſtalline humor being more denſe than the vitreous, the light in paſſing from the chryſtalline into this humor, will be refracted from the perpendiculars P, *l*, P, *l*, but becauſe the ſurface of this humor is not convex as that of the other humors, but concave, anſwering to the convex back part of the chryſtalline, which is lodged therein, theſe perpendiculars muſt recede from one another, as in the figure, and conſequently the rays, by being refracted from them, muſt be made yet more to converge, and approach one another.

By

late 2.

To front



By theſe refractions, the rays of light which came the point B, are made to converge and meet again in the *retina* at the point *b*; and in like manner the rays that come from all the other points of the object, as from A and C, are made to converge to ſo many other points in the retina, as *a* and *c*, and by that means an inverted picture of the object will be painted on the *retina*, juſt as when, by a glaſs lens placed at a hole in the window ſhut of a dark room, the inverted images of external objects are caſt upon a piece of white paper, placed at a due focal diſtance behind the lens. And as this is agreeable to reaſon and geometry, ſo it is confirmed by experience; for if you take off from the bottom of an eye, newly taken out of the head of any animal, a ſmall portion of the *tunica choroides* and *ſclerotica*, and place this eye in a hole made in the window ſhut of a dark chamber, ſo as the bottom of the eye may be towards you, you ſhall then ſee the pictures or images of external objects lively painted on the *retina*, with their proper figures and colors; only theſe pictures will be inverted, as has been already noticed.

CHAP. III.

OF IMPERFECT SIGHTS.

BY the general term of imperfect ſight, is meant, a debility of ſight, either *abſolute* or *relative*, without any opacity of the cornea, or internal parts of the eye.

An obſcurity and confuſion of ſight is ſaid to be relative, when an object cannot be ſeen in all the uſual diſtances and poſitions of it, and in a common light, but only in ſome; thus *myopes*, or ſhort-ſighted perſons ſee diſtant objects confuſedly, but thoſe near at hand diſtinctly, wherefore their ſights are imperfect in reſpect of diſtant objects.

That ſight is *clear*, which is ſufficient for the taking in the whole of an object, and diſtinguiſhing it from others; that is *obſcure*, when inſufficient for thoſe purpoſes.

A *diſtinct* ſight is that which is ſufficient for knowing and diſtinguiſhing the parts of an object, and the particles of the part; the contrary conſtitutes a *confuſed* ſight.

An imperfect ſight differs from an *amaurofis* or *gutta ſerena*, as that in the latter, ſight is entirely loſt, and the pupil becomes immoveable: but, however, if one eye remains ſound, the pupil of the blind eye is moved with the pupil of the ſound one; but the ſound one being ſhut, the pupil of the diſeaſed one is then entirely deſtitute of motion. Moreover, in a relatively imperfect ſight, the eye ſees objects clearly and diſtinctly under certain circumſtances, but in a *gutta ſerena*, none.

The cauſe of an imperfect ſight is a confuſion of the image painted upon the *retina*; now there is a confuſion in the image, as often as the little packets of rays, coming from one point of an object are not united upon the ſame, but in different points of the *retina*; or ſeveral packets from different points of an object radiate together upon one point of the image: ſuch is the confuſion which takes place in ſhort and long, or old ſightedneſs.

Confuſion alſo ariſes from obſcurity, as in an abſolute imperfect ſight; for as no image is diſtinct unleſs it is clear, every obſcure image is neceſſarily confuſed; it is obſcure as often as the clearneſs or quantity of rays is not ſufficient, on account of the miſtineſs of the eyes, or their not having ſufficient force upon the *retina*, on account of its diminiſhed ſenſibility.

SECT. 1.

A *Crepuſcular* or *Twilight Blindneſs*, called by the Greeks, *Hemeralopia.*

IT is that in which viſion in the morning or evening twilight, is dull and confuſed, in the ſame place where thoſe, endued with perfect ſights, ſee diſtinctly.

This diſeaſe many years ago, was epidemical in the neighbourhood of Montpellier, more eſpecially in the towns contiguous to a river, and among the ſoldiers doing duty as centinels, and expoſed to the damps and fogs of the night ſeaſon.

But as thoſe were cured, in whom by means of purges, vomits, diuretics, bliſters, and the like, the ſuperfluous ſerum was evacuated from the maſs of blood, one or two bleedings being premiſed, it is highly probable, that this ſpecies proceeded from a ſuperfluous ſerum in the maſs of blood, which particularly affected and relaxed the organs of ſight. It certainly is not difficult to be conceived, that from a humid and cloudy atmoſphere, in the autumnal ſeaſon, the perſpirable ſerum may be retained in the maſs of blood, and thus become redundant.

That this relaxing cauſe acts rather upon the *retina* than on other parts of the eye, the obſcurity of ſight, conſequent upon this relaxation, ſeems to perſuade; for as the obſcurity of ſight is made in a compound ratio, from the inverſe of ſenſibility, and the inverſe of light conjointly, it is evident that, a leſſer ſenſibility of the *retina* being ſuppoſed, the obſcurity will be little in a ſtrong light, and in a moderate light, as twilight, great; ſo that the patient may ſee diſtinctly enough at noon-day, but on the approach of evening, viſion will become very confuſed and obſcure, for the faintneſs of the light at that time, concurs with the leſſer ſenſibility of the *retina*, to encreaſe the obſcurity of viſion.

In this affection the pupil is more dilated than in perfect ſights. If there was a total inſenſibility of the *retina*, its dilatation would be exceedingly great; but as there is only a diminiſhed ſenſibility of the *retina*, the dilatation of the pupil is encreaſed about noon day: in the evening when the light is diminiſhed, the pupil is again more dilated; for nature dilates the pupil in that proportion, in which a greater quantity of light is wanted for the purpoſe of viſion: and when the diminution of the light is accompanied with an inſenſibility of the *retina*, the dilation of the pupil is increaſed in a degree proportioned to each.

The method of cure is manifeſt from what has been ſaid; we muſt endeavour by every help to reſtore the former tenſion of the *retina*, and for this end, that the redundant ſerum in it, may be received back through the abſorbent veins, and derived to the ſtrainers of the kidnies, inteſtines, and ſkin, and to ulcers made with bliſters behind the ears, a drying diaphoretic diet being uſed at the ſame time.

Boerhaave enumerates a variety of this diſeaſe, which depends upon an immoveable ſtricture of the pupil, while the retina enjoys its wonted ſenſibility: in a ſound ſtate the aperture of the pupil anſwers reciprocally to the ſenſibility of the retina, and therefore it is repugnant for the pupil not to be dilated in the ſame proportion, in which the intenſeneſs of the light decreaſes; but however it may happen that the aperture of the pupil, on account of a ſingular inſenſibility of the uvea, may not obey that law. The reaſon why I relate this, is becauſe, as *Haller* teſtifies, if the uvea is punctured with a needle, as I have ſeen in the operation for the cataract, and as he himſelf performed it in animals, it it is not at all moved, from whence we may eaſily infer, that it is furniſhed with none or exceedingly few nervous filaments. *Boerhaave* knew no remedy for this diſeaſe, more eſpecially if, as is generally the caſe, this rigidity of the uvea happens to old perſons.

SECT. II.

A Meridian Blindneſs.

THOSE who are unable to diſcern objects during the day time, but in the evening and night ſee tolerably well, are ſaid by *Hippocrates* to be *Nyctalopes* or night ſighted. Of this ſpecies *Boerhaave* mentions two varieties. The firſt proceeds from an opake round ſpot or partial cataract in the middle of the chryſtalline, exactly behind the pupil, but a little leſs. In this caſe the pupil will be made to contract during the bright day light to ſuch a degree, as to exclude all rays of light, but thoſe which fall upon the opake ſpot in the chryſtalline, and therefore no image can be painted on the retina; but in the evening, the pupil dilates, and therefore a ſufficient quantity of light will penetrate the limb of the chryſtalline, to effect a clear ſight. What has been ſaid of a ſpeck in the chryſtalline, will alſo hold, when ſuch a ſpeck is on the cornea.

The ſecond variety is owing to an extream ſenſibility of the retina, ſuch as happens in an internal opthalmy, while the uvea retains its accuſtomed moveableneſs; for juſt as in an external and violent opthalmy, nature ſhuts the eyelids ſo accurately, as that the patient himſelf, even with his hand, can ſcarcely open them, through a fear of the pain, which light brings on; ſo it is no wonder, if while the retina is exceſſively ſenſible, as in an internal opthalmy, nothing can determine nature to open the pupil.

The firſt variety is to be removed by the electrical fluid; or, if that does not ſucceed, by the couching needle; the ſecond is to be treated in the antiphologiſtic manner, as in opthalmy's.

SECT. III.

Myopia or Shortſightedneſs.

MYOPES or ſhortſighted perſons are thoſe who ſee confuſedly objects at a little diſtance, but diſtinctly thoſe which are very near.

Thoſe are very liable to a myopia, who are converſant with minute objects; as goldſmiths, watchmakers, engravers, and miniature painters; in whom the cornea is very convex, or in reſpect to the globe of the eye, is a part of a much leſſer ſphere.

The cauſe of this is an union of the rays of light, behind the chryſtalline, before they arrive at the retina; either, Firſt, becauſe the refractive power of the aqueous and chryſtalline humor is too great, or ſecondly, becauſe the cornea and external face of the chryſtalline is too convex, or thirdly, becauſe the retina is too remote from the chryſtalline, or fourthly, becauſe the object is too diſtant, or fifthly, becauſe the pupil is too open; or to ſpeak more properly, a myopia is in a compound ratio made up of theſe conditions, viz. of the refractive power of the aqueous and chryſtalline humors, of the diſtance of the chryſtalline and cornea from the retina, of the diſtance of the objects, and laſtly of the aperture of the pupil.

The curative indication is either *palliative* or *radical*; the palliative regards the cauſe of this diſeaſe, the radical the origin. Whatever is the origin, which is more frequently unknown, the cauſe is an adunation or junction of the rays before they reach the retina. The remedy therefore is to retard that adunation, until the rays do reach the retina. Now experience teaches, and dioptrics demonſtrate, that a plano-concave or double concave glaſs being applied to the eyes, the rays proceeding from diſtant objects, and therefore mutually parallel to themſelves, fall upon the eye mutually diverging from one another, and in conſequence fall in the ſame manner, as if they went off from an object near at hand, in which caſe the focus recedes from the lens; therefore if a glaſs of a proportionate concavity is uſed, at a due diſtance from the eye, the focus of rays proceeding from diſtant objects, will be extended even to the retina itſelf, and will not fall ſhort of it as before, and thus a diſtinct viſion will be effected.

Short ſighted perſons commonly become leſs ſo, as they advance in years, and that becauſe the humors of the eye do daily waſte and decay; from which decay in the humors, the cornea ſhrinks, and becomes leſs convex, and the chryſtalline becomes flatter than before, by which means the rays of light will be leſs refracted, and will not meet ſo ſoon behind the chryſtalline; and therefore the image on the retina, and the viſion cauſed thereby, will be more perfect and diſtinct, and the eye will be enabled to ſee at a greater diſtance, than when the refraction was ſtronger in the more plump and convex eyes.

SECT. IV.

Presbytia. Presbyopia. Long or Old-ſightedneſs

IN this ſpecies of ſight, near objects are ſeen confuſedly, but remote ones more diſtinctly.

Thus women who are long-ſighted, when they thread a needle, remove the needle and thread to ſome diſtance from their eyes; old men alſo, that they may read more diſtinctly, remove books beyond the diſtance of eight inches from their eyes.

The theory of this is eaſy, from the preceding one; the cauſe is the too late union of the rays coming from near objects, which is performed beyond the *retina*.

The principles are, Firſt, a leſſer convexity of the cornea, and of one or both faces of the chryſtalline, ſo that the curvature of them is a portion of a larger ſphere. Secondly, a too great diſtance of the cornea or chryſtalline or both from the *retina*. Thirdly, the refractive power of the pellucid bodies of the eye, leſs than uſual. Fourthly, a too great proximity of objects. Fifthly, a narrowneſs of the pupil which the Greeks call phtiſis.

By means of each, and much more by the concourſe of all theſe principles, it happens that the rays iſſuing from proximate objects are united too late, and advance the focus beyond the *retina*, from whence there cannot be a diſtinct viſion; for the luminous pyramid is cut off from the *retina* with its rays not yet collected together into the apex of the cone; therefore every point of the object paints a ſpot on the *retina*, the ſame as in ſhort ſighted perſons, with this difference only, that the ſpot is made by rays not yet united together, and in ſhort ſighted perſons by rays already united, and again expanded.

Old-ſighted perſons, in order that they may ſee diſtinctly, require a great light: on the contrary myopes or ſhort-ſighted perſons require but a ſmall light to enable them to read; for the former have a *retina* more rigid from age, a narrower pupil, and objects more remote, all which leſſen the clearneſs of ſight: therefore thoſe defects ſhould be compenſated by a greater ſplendor or illumination of an object.

Convex glaſſes are proper for this ſpecies of ſight; for, they ſo refract the rays of light coming from a near point, as to make them fall upon the eye in the ſame manner, as if they iſſued from a diſtant point. Therefore, old-ſights are moſt aſſiſted, the more glaſſes are convex, or whoſe convexity is a portion of a leſſer ſphere. They are in ſome meaſure relieved by looking through a black tube held before the eye, by the uſe of which the *retina* grows tenderer, and the rays come in a more parallel direction.

But if, as ſometimes happens, a preſbyopia ariſes from a conſpicuous fault of the eye, and that recent, then helps may be indicated, towards a radical cure, from the preceding theory.

SECT. V.

An abſolute Dulneſs of Sight.

MYOPES, Preſbytæ and the other imperfect ſights above mentioned, in a certain diſtance or poſition of the object, ſee diſtinctly, and their ſight is not confuſed, unleſs relatively to other diſtances, hours and poſitions; but this ſpecies imports an abſolute dulneſs of ſight in whatever place, time or ſituation. Myopes, preſbytæ, &c. when they diſcern acutely, may ſafely do without glaſſes, but the abſolute dull ſight cannot.

It ſeems to depend on a leſſer ſenſibility of the *retina*, ſuch as happens to almoſt all men after their fiftieth year, and encreaſes as they grow old; more eſpecially to thoſe who are employed in minute works, who write at night and abuſe their eyes. The horopter or boundary of diſtinct viſion in them is ſhortened from time to time, two or three inches within every ten years; objects attentively conſidered appear to them confuſed; the characters of books ſeem to be doubled, moved and decuſſated; their eyes being wearied, are every now and then to be rubbed, and ſhut; objects are removed from the eye as in a preſbytia, more eſpecially if the patients ſhall have undergone the operation for the cataract. The pupil, or to ſpeak more properly the uvea, is ſcarcely moveable, even when a ſudden tranſion ti is made from darkneſs to the light, which is a plain ſign of a diminiſhed ſenſe of the *retina*.

In this diſeaſe, which the common people attribute to repeated bleedings, women, to a frequent child-bearing, but few to their growing in years, vain remedies, contrary to one another, are propoſed by various people; for ſome oculiſts praiſe ſpiritous reſolvents; others extol mere cold water, and contend that the *retina* is ſtill farther dried by ſpiritous remedies. But the uſe of glaſſes all agree to be neceſſary. Double convex glaſſes are the ſort proper to be uſed; for as by the help of theſe, the rays being collected, more ſtrongly affect the *retina*, from thence clearneſs is reſtored to the ſight, and with it diſtinction, which advantages are alone to be expected from glaſſes.

The chief rules in chooſing glaſſes are, Firſt, That the glaſſes be worked to a uniform curvature, pure and well poliſhed. Secondly, That they have a focus ſuited to the complaint. Thoſe which have a ſhorter focus, are called *older*, thoſe which have a longer, *younger*; thoſe which have the longeſt focus, as four, five, ſix feet, *preſervers*: but thoſe which have the ſhorteſt, as four, three inches, are called *cataracts*.

Thoſe who accuſtom themſelves to older glaſſes, or thoſe of a ſhorter focus, are compelled every ten years, by degrees, to uſe ſtill older, which is very inconvenient, inaſmuch as ſight is ſo much the more ſhortened; for inſtance, thoſe who uſe preſervers, for example, of ſix feet, read beſt at diſtances between eight inches and ſix feet; but thoſe who uſe glaſſes of ſix inches, cannot diſtinguiſh characters placed beyond ſix inches, unleſs they are much larger.

From hence flows a rule of the greateſt moment; namely, that we ſhould at firſt uſe the younger glaſſes, or preſervers, and ſhould not paſs on to older, unleſs obliged to it, and by degrees. Thoſe who are not yet accuſtomed to glaſſes, ought to try ſeveral, and to uſe, firſt, thoſe which exhibit objects clear and diſtinct, but do not ſenſibly enlarge them, if they are double convex, or diminiſh them if they are double concave, neceſſary for myopes. Secondly, Thoſe which do not weary the ſight.

Beſides glaſſes, or ſpectacles which are more convenient, or hand glaſſes, imperfect ſights uſe to advantage Dutch tubes, commonly called opera glaſſes, made up of a double convex objective, and a double concave ocular of a leſſer diameter; but let the tube be ſhorter for a myops, and longer for a preſbyta; all eyes are equally aſſiſted by theſe tubes, as they exhibit objects clearer and more diſtinct.

SECT. VI.

Oblique ſightedneſs.

THIS is, when perſons ſee confuſedly objects preſented directly before their eyes, but diſtinctly thoſe which are offered obliquely.

An oblique ſight is commonly in practice confounded with a ſtrabiſmus or ſquint. But in the latter perſons ſee diſtinctly, with one eye, an object preſented directly before their eyes; whereas in the oblique ſight, they incline the face and eye itſelf to one or other ſide, from whence they look, that they may ſee the object more diſtinctly. A *ſight* is called *ſtraight*, when a line extended from an object to the face of the beholder, is perpendicular to the plane joining both pupils, otherwiſe the ſight is *oblique.* When we are about to look at an object, we always turn our face ſo towards it, as to have a ſtraight or direct view of it; and at the ſame time we ſo direct both eyes, that the optical axes may fall upon the middle of the object; but an oblique ſighted perſon, while he looks at an object, which is, for example, to the right, turns his eye and face to the left. A perſon who ſquints indeed turns one eye and his face to the object which he beholds, but not the other eye, which wanders here and there.

A ſtraight is clearer than an oblique ſight, becauſe a greater number of rays enters the pupil: and alſo a ſtraight ſight is more diſtinct, becauſe the diſtance and magnitude of an object will be more eaſily aſcertained by rays perpendicular to the uvea, than by oblique ones: add to this, that in a ſound ſtate, the optic pole, or that part of the *retina* directly oppoſite to the pupil, poſſeſſes more nervous filaments, and a more exquiſite ſenſe than its ſides; and laſtly, rays falling obliquely upon the pupil, have a focus more diffuſed in the ſides of the *retina*, than thoſe which come ſtrait upon the optic pole.

From thence it is that in reading a book, we run over every word with our eyes; for we ſee more diſtinctly thoſe which are offered directly to our eyes, but more confuſedly thoſe which are placed obliquely.

An oblique ſight happens either, firſt, Becauſe the pupil is placed obliquely, ſo as that it may receive more oblique than direct rays. Secondly, Becauſe the convexity of the *cornea* is altered, or its pellucidity, ſo that more rays are admitted from one or other ſide, than if they ſhould come directly. Or, thirdly, Becauſe the chryſtalline is placed obliquely, and its axis is not the ſame with the axis of the eye. Or, fourthly and laſtly, Becauſe the pole is deſtitute of natural ſenſibility, from whence we are compelled to direct our ſight another way, that we may diſcern more acutely.

SECT. VII.

Strabiſmus or *Squinting.*

IT is a tonical affection of one or other eye, by which it happens, that the optical axes do not converge with each other for ſight.

The optical axes is a ſtraight line, which joins the centers of the vitreous, chryſtalline and globe of the eye, and which is thought to be extended even to the object.

It is requiſite for viſion, that the axes of the right eye ſhould concur at the ſame point of the object, with the optical axes of the left: from the angle intercepted by theſe axes, we infer the magnitude and diſtance of objects; therefore if the axes diverge, as in perſons who ſquint, we can judge neither of the diſtance, nor of the magnitude of objects.

We therefore perceive an object ſingle, altho' looked at with two eyes, becauſe, the eyes converging, the image of the object falls on the optic pole of each eye, and we have been accuſtomed in theſe circumſtances, to experience a ſingle object to excite that ſenſation; but when the eyes diverge in an unuſual manner, the images of the ſame object fall upon parts of the eyes not correſpondent with one another, and as that double ſenſation is unuſual, we are ſenſible of it; we do not by turns refer both images to one, but to a double object, from whence a double ſight in thoſe who are troubled with a recent ſquinting, which error is however corrected by uſe and the intervention of the touch.

The common ſquint is that in which, on account of a bad cuſtom, of continually directing one eye towards one part, the faculty of converging both optical axes here and there, at pleaſure, is loſt: thus infants, who, while in their cradles, look at a candle or the window light from one ſide only, or from having many agreeable objects preſented to them at once, which invite them to turn one eye to one, and the other eye to another, and alſo thoſe who uſe themſelves to behold a blemiſh or point upon their noſe, acquire a habit of ſquinting.

Infants newly born move one eye ſeparately from the other, here and there, like cameleons; but afterwards, they by degrees obſerve objects to be ſeen more diſtinctly and clearly with both eyes, and thus learn to direct their optical axes together to the ſame object, which direction afterwards becomes natural, ſo that it can ſcarce be changed by the will.

This ſpecies of ſquint is eaſily prevented, but when it exiſts, it is cured by concave conical glaſſes, pierced only at the apex or tip, or in adults by attention, and reading a ſmall print before a looking glaſs, and an habitual endeavor to leſſen the ſquint, and bring the optical axes nearer to a parallel direction. We have naturally the power of making ſmall variations in the inclination of the optic axes; and this power may be greatly increaſed by exerciſe. If once by an effort of his will, the patient can but leſſen his ſquint, frequent practice will make it eaſy to leſſen it, and will daily increaſe his power; he may practiſe before a mirror when alone, and in company he ought to have thoſe about him, who will obſerve and admoniſh him when he ſquints.

Sometimes this want of uniformity in the motions of our eyes, depends on a weakneſs in one of them; for in this caſe, as the diſtance is unequal to which the ſight of both eyes extends, we are uſed to direct the ſtronger eye to the object, and omit the weaker, becauſe it is uſeleſs for the diſcernment of objects, as often as they are removed to the diſtance neceſſary for the other; for example, if the right eye ſhould not ſee beyond half a foot, and the left beyond a foot, we look at objects only with the left; from whence a ſquint, which is difficult to be cured. A weakneſs of the eye is either from the birth, which is incurable, or it depends on a palſy, attack of an epilepſy, &c. the remedies muſt then be ſuited to the cure of theſe diſeaſes.

A ſquint may be produced from a ſpaſm of any muſcle, of one or both eyes, on account of a convulſion having formerly preceded; by which means that muſcle becomes immoveable; then the eye is ſtiffiſh and reſiſts to the finger, and is conſtantly turned to the left, to the right, upwards or downwards.

If one or other of the ſtrait muſcles ſhall have been relaxed and reſolved by a palſy, wound, ulcer, or by any cauſe whatſoever, then the antagoniſt being convulſed, remains immoveable, as happens to the mouth in a hemiplegia; or the whole eye may be affected with a palſy, and then it remains immoveable and fixed, and does not converge with the ſound one; the cure is the ſame as for the palſy.

There is another ſpecies of ſquint ariſing from a painful catarrhous congeſtion, or ſome other thing of the like nature, in one or other of the muſcles, ſo that the pain prevents that muſcle from moving freely. This is eaſily cured by bleeding, reſolvent fomentations, and anodynes; but we muſt beware of applying narcotics to the eyes, leſt a *gutta ſerena* ſhould be brought on thereby.

A

TREATISE

ON THE

Diſeaſes of the EYE.

PART II.

L 2

A TREATISE, &c.

CHAP. I.

A falling down of the ſuperior Eyelid.

IN this diſeaſe, the ſuperior eyelid falls down, ſo as to overſhadow the *cornea*, and as it cannot be lifted up by the action of the elevator muſcle, the eye is not at all, or not ſufficiently denuded, and ſo, for the moſt part, there is no ſight, unleſs the eyelid is continually lifted up by the hand.

This diſeaſe happens firſt, from a mere relaxation of the eyelid, brought on by a ſuperfluous ſerum; and ſecondly, from a reſolution of the elevator muſcle, or a palſy of the eyelid, happening frequently to old people, which is ſometimes conſtant, but ſometimes periodical. In this laſt caſe, it is obſervable, the cheek of the ſame ſide is much relaxed, the jaw and tongue are alſo paralytic, and the eye itſelf affected in like manner.

In the firſt caſe ſtrengthening, ſpiritous, reſolvent fomentations, are preſcribed, aſſiſted with cathartics, and other evacuants. The ſecond is to be attacked with antiparalytic remedies, externally and internally. *Baumer* ſpeaks of a cure being wrought by electricity. Mr. *Warner* recommends cold bathing, the Peruvian bark, joined with volatiles, if they ſhould be neceſſary, aſtringent topics, and compreſs and bandage applied to the part in the day time: or the eyelid may be ſupported by the help of an adhæſive plaſter applied upon the forehead and lid. *Platner* ſays, if ſtrengthening ſpiritous applications ſhould avail but little, we muſt try cantharides, by applying a very ſmall plaſter of them on the middle of the eyelid. *St. Yves* ſpeaks of the uſe of fumigations, and has given a receipt for one, and indeed not a bad one. Let roſemary, thyme, and ſage, be boiled in wine in a coffee-pot; and when done let a common funnel of a proper ſize be overwhelmed on the top of the coffee-pot, and the ſteam be received thro' the nozel on the diſeaſed eye, at ſuch a diſtance as to be borne without pain. *Plempius* directs, (cuppings, derivers of pituita from the head, and an iſſue in the neck, being premiſed) a fomentation made from *marjoram*, *chamomile*, and *melilot* flowers, and *cummin*, together with *balauſtines* and *pomegranate rind.* *Cantwell*, in the philoſophical tranſactions, gives a caſe of a palſey of the eyelids recurring every night, with a diſcharge of white matter, which was cured in a few days, by having the waters of *Balleruc*, near *Montpelier*, pumped upon the neck and back part of the head. There is an inſtance recorded in *Mangetus* of a cure of a palſey of the eyelids, effected in a ſhort time, after many other remedies both internal and external had been tried in vain, by the *Ol. Tartar. nigr.* made into a plaſter with wax, and applied to the part affected.

I myſelf am acquainted with the caſe of a gentleman at Chicheſter, who laboured under this complaint for ſome time, which became at length ſo bad as almoſt to cloſe his eyelids, and hinder him from going abroad with ſafety. In this ſituation he came to London, to ſeek relief, where he was perfectly reſtored in about a week, by anointing and gently ſtroking over the eyelid, and the part above it next the eyebrow, ſeveral times in a day, with the following liniment.

℞ *Mari ſyriaci* ℥iv.
Sp. vin. rectif. lbiv. ft. tinctura, *Adde*
Saponis duri lbi.
Camphor. ℥iv.
Sp. * ℥v.

Two other perſons alſo, afflicted with the ſame diſorder, but in a leſs degree, received equal benefit from this liniment uſed in the ſame manner.

When all other means prove inſufficient for the cure, it is recommended, after the example of the antients, to pinch up the ſkin of the eye-lid, in the direction of its folds, and take off a portion of it, afterwards uniting the lips of the wound by ſuture. The wound being healed, and the ſkin not being ſo elongated, ſays *St. Yves*, the motion of the levator palpebræ will return, and the patient will find himſelf perfectly cured.

CHAP. II.

Lagopthalmos. The Hare's Eye.

THE Hare's eye is a gaping of the eyelids, produced by a retraction or natural ſhortneſs of one or other of them, by which it happens that its motion becomes confined, and does not cover the eye during the time of ſleep. The *cornea*, by being thus continually expoſed, at firſt becomes dry, afterwards loſes its tranſparency. This is mentioned by almoſt all writers as a diſeaſe of the ſuperior eyelid, but the accurate, *Heiſter*, aſſerts the having ſeen it, not infrequently, in the lower eyelid alſo.

It is ſaid to proceed, firſt, from a defect of matter, and fault of conformation while in the womb. Secondly, from a bad habit, as when infants in their cradles look continually upwards, or backwards. Thirdly, from a dryneſs brought on by the uſe of too aſtringent ophthalmics. Fourthly, From a ſpaſm of the *Elevator palpebræ* and a palſy of the *Orbicularis*. Fifthly, from a cicatrix which remains in conſequence of a wound, ulcer, or burn; and this is by much the moſt frequent cauſe.

When this diſeaſe proceeds from an original bad conformation, it is incurable. When it is contracted from a cuſtom of looking always behind, or upwards, as the infant lies in the cradle, it muſt be cured (or rather it ſhould be prevented) by a contrary habit, viz. by wrapping up that part of the cradle next the head with black cloths, and keeping it in the dark, and turning the feet to the light, that by theſe means the infant may continually look towards the light. When this complaint proceeds from a ſpaſm or palſy, it muſt be ſubdued by remedies proper for thoſe diſeaſes, among which electricity promiſes to be the moſt powerful. When proceeding from other cauſes, ſuch remedies as moiſten, ſoften, and relax, are to be uſed to the part affected. To this end, therefore, as ſoon as ever the eyelid is perceived to be at all affected with this diſeaſe, it ſhould be diligently fomented with the vapor of warm milk or water; or anointed with oil of almonds, or olives; or with mucilage of quince ſeeds, hare's fat, ointment of marſhmallows, or ſome ſuch like application. At the ſame time the diſeaſed eyelid, if the ſuperior ſhould be frequently drawn downwards; if the inferior, upwards. Nor will it be amiſs, eſpecially at night, to lay plaſters, drawing in contrary directions upon each lid, and to aſſiſt them by compreſs and [illegible]

But if theſe remedies, after having been continued for a long time, ſhould fail of producing the deſired effect, we muſt have recourſe to ſurgery; by means of which we may poſſibly afford relief, provided too much of the eyelid be not wanting, and there be a ſufficient thickneſs: Therefore having ſeparated the eyelids, let a piece of horn, or ſheet lead (beſmeared with ſome kind of greaſe, and covered with a piece of thin bladder) be introduced withinſide the diſeaſed lid, which is then to be drawn forwards, and an inciſion made, in the direction of the fibres of the orbicularis muſcle, through the external ſkin and fat. If the affection be but ſlight, one inciſion will be ſufficient, but if much of the eyelid be wanting, two or three parallel inciſions ſhould be made, at a ſmall diſtance from each other. Care muſt be taken afterwards, to prevent a freſh coalition of the ſkin, and alſo to excite the growth of fleſh in the middle of the wound. It will alſo aſſiſt the cure, if narrow ſlips of plaſter be laid on, by means of which the ſuperior eyelid may be drawn downwards, and the inferior upwards. In this manner we are to proceed, until the wound is filled up with new fleſh, and the eyelid finds itſelf ſufficiently enlarged, to perform its function properly.

CHAP. III.

Ectropium. An Everſion of the Eyelid.

THE ſigns of this affection are, a ſhortneſs and extraverſion or turning outwards of the eyelid, ſo that the red internal part projects, occaſioning a diſagreeable appearance; nor is the eye ſufficiently covered. This diſeaſe may happen to either eyelid, but is more frequently obſerved in the lower.

The cauſes aſſigned for this diſeaſe, are various; Firſt, a rough and improper handling of the eyes of the infant by the midwife. Secondly, a laxity of the internal membrane of the eyelid, brought on by too long a uſe of emollients. Thirdly, a weakneſs or relaxation of the orbicular muſcle, as in old people. Fourthly, fungous fleſh ſprouting up in ulcers of the internal membrane, or after violent or frequent inflammations of the eye or eyelids, of which *Heiſter* mentions having ſeen many and terrible examples, or a tumor in the internal part of the eyelid. Fifthly, a cicatrix ſucceeding a wound, ulcer, or burn; and this *M. Jan* aſſerts to be the moſt frequent cauſe. Sixthly, a ſeparation of the tarſi, at the great canthus, in the operation for the fiſtula lachrymalis, or from the ſucceeding ſuppuration when the inciſion has been made too near the commiſſure of the eyelids. Seventhly, a marginal diſſolution; when by a wound or ulcer the tarſus is divided, from whence the angles of the fiſſure are retracted, and turned back into a bifid point, either inwards or outwards.

The firſt ſpecies, authors do not mention any cure for. The ſecond we are to endeavour to remedy by a long uſe of ſtrengtheners, aſtringents, and deſiccants. In the third ſpecies, if any relief is to be expected, it muſt be obtained alſo by ſtrengthening, drying, ſpiritous remedies; ſuch as, a dry heat; ſpiritous focus uſed in vapor; the clay of warm baths. *Kennedy* mentions rags dipped in warm claret and honey, among the remedies proper to be tried in this caſe; but he thinks that a machine of lead made on purpoſe for the diſeaſed eyelid, and worn for ſome time upon it, would be of the greateſt uſe. *Celſus* adviſes the application of the actual cautery externally, which ſhould be done with great circumſpection, firſt of all introducing a piece of ſheet lead into the eye. With regard to the fourth cauſe; if a tumor has grown out withinſide the eyelid, it is to be cured by proper topical remedies, or it is to be taken away by cauſtics, or an artificial exciſion. If a fungus has ariſen, after having appeaſed any inflammation there may happen to be, by proper medicaments, it is to be carefully touched every now and then, with the lapis infernalis, taking great care to defend the eye, by anointing it with axunge, or ointment of tutty, and inſerting a piece of bladder between the eye and eyelid; and thus it is to be gradually conſumed, until the eyelid reſtores itſelf by the ſpring of its tarſus; or it may be removed by the knife, previouſly paſſing a crooked needle, or a ligature through its baſe, for the more convenient holding of it, while the extirpation is performing; or if the baſe be ſmall, it may be taken off by ligature, which will be more effectually ſecured from ſlipping, if it be paſſed through the fungus. We are to attempt the cure of the fifth ſpecies by the ſame means as were preſcribed for the cure of the Hare's Eye proceeding from the ſame cauſe. The ſixth is irremediable, unleſs it can be cured by the operation which *Le Dran* relates the having performed ſucceſsfully, and which conſiſts in taking off a portion of the margin of each eyelid, at the great angle, together with the whole cicatrix, and afterwards uniting them by ſuture. The ſeventh is to be remedied, if it be recent, by a proper ſuture of the conjunctive and ſkin, leaving the tarſus untouched, and which *St. Yves* recommends to be done in the following manner. A crooked and ſomewhat cutting needle, threaded with a waxed thread, is to be firſt paſſed through the two lips of the wound of the internal membrane near the margin of the eyelid, after which the needle is to be withdrawn, but the thread to be left behind, the two ends of which are to be ſuffered to hang out: a ſilver needle with a ſteel point is next to be introduced through the lips of the wound of the external ſkin, near to the margin of the eyelid alſo; this needle is to remain in, upon which ſeveral turns in form of a figure of 8 are to be made with the threads which have been left hanging out, obſerving firſt, to paſs each thread under that extremity of the needle which anſwers to it, before it is turned. Afterwards a cooling collyrium is to be applied, until the wound is reunited; then the needle and threads are to be withdrawn. This ſpecies of ectropium, when of long ſtanding, admits of no remedy. *M. Jan* thinks it always incurable, however ſlight or recent the affection may be; becauſe, as he ſays, the eyelid has not a ſufficient thickneſs to ſuſtain the needle ſo long a time as is neceſſary to bring about a reunion.

CHAP. IV.

Trichiaſis.

THIS diſeaſe is produced by a direction of the eyelaſhes towards the globe of the eye; occaſioning great irritation, which unleſs ſeaſonably remedied, is followed by exceſſively acute pains, inflammation, difficulty of ſeeing, and even blindneſs itſelf.

If the long hairs of the eyelids ſhould get between the globe of the eye and the eyelid, they will produce an opthalmy which will go off upon their extraction; but if the little pores through which theſe hairs are tranſmitted, have been ulcerated from any cauſe, and a cicatrix afterwards brought on, the eyelaſhes when they come to ſhoot forth afreſh, finding the texture of this place more compact, and harder, will take a different rout, and carrying themſelves on the inſide, where they find leſs reſiſtance, will ſharply prick, inflame, and ulcerate the eye, until they are extirpated.

It is in vain to cut theſe hairs, as they only grow again the ſtiffer for it; they therefore ought to be plucked out, one by one, at diſtant intervals, obſerving to take them out whole; for if they are broke in the middle, they prick more than while they are intire: and afterwards, to prevent their coming anew, we ought with all due precautions to cauterize the place from whence they have been plucked, with the lapis infernalis. *Heiſter* ſpeaks of ſpirit of ſal ammoniac, and alſo highly rectified ſpirit of wine, as remarkably efficacious for this purpoſe; for, he ſays, when the eyelids, after the hairs are extracted, are anointed, by means of a ſmall pencil bruſh, with theſe, the little foramina generally ſoon coaleſce, and no new hairs ſucceed. *Celſus* directs the deſtroying of the roots of the hairs by the actual cautery. *Ægineta* alſo ſays that if the hairs be firſt plucked out with the forceps, and the actual cautery applied afterwards, the ſkin will become more compact, and no new hairs will grow out. In either of theſe operations it will be abſolutely neceſſary to cover with the utmoſt care the pupil of the eye, either with lint, or a concave thin plate of lead, horn, wax or ſome other ſuch like material, nearly in the ſame manner as is wont to be done in artificial eyes, leſt it ſhould be endangered from the application of the cautery, or acrid medicaments.

But if theſe pernicious hairs ſhould have grown out of the whole margin of the eyelid,

and

and the patient is either unwilling or unable to bear the extraction, and cauterization *Heiſter* adviſes, as the only, though a dreadful, reſourſe, to cut off the margin itſelf of the eyelid, together with the projecting hairs, leſt blindneſs ſhould enſue; for, he obſerves, it is better to render the eye deformed, than for the ſight entirely to periſh. *Cortumius* thinks it better to take off the margin of the eyelid by the lapis infernalis, than with the knife; and he directs it to be done in the following manner. The patient is to be laid on his back, and the eye being defended with ſome lint, linen, or leather, the external and internal margin of the eyelid is to be well anointed or rubbed with the beſt lapis infernalis, until the margin, together with the hairs, is eroded. After this is thoroughly done, dry lint is to be applied: in about an hour afterwards linen dipped in roſe water and white of egg is to be applied over it, and frequently renewed: the day after, part of the lint is to be taken away leſt it ſhould cauſe inflammation: but as ſoon as ever a cruſt is perceived underneath, the whole of the lint is to be removed, and the cruſt is to be anointed with ſome mild digeſtive ointment. In this manner after the ſixth or eighth day, as *Cortumius* aſſerts, the wound will generally be found healed.

There is another ſpecies of trichiaſis, owing to relaxation, and ſaid to ariſe from a ſerous humor collecting between the orbicular muſcle, and ſkin covering it, which weakening and diſtending the external ſuperficies of the eyelid, turns the cartilage itſelf round, and with it the eyelaſhes towards the globe of the eye, by which means the inconveniences mentioned in the firſt ſpecies, are induced. When the cartilage is thus inverted, the eyelid is externally bloated up, having a kind of emphyſematous appearance. This ſpecies is chiefly incident to old people. The remedies proper to be uſed in this caſe, are, ſtrengthening, ſpiritous, reſolvent fomentations. *St. Yves* mentions a mixture of a drachm of ſpirit of ſalt, with a gallon of ſpirit of wine, to rub the eyelids with five or ſix times in a day. He alſo recommends, when the diſeaſe is in the lower eyelid, a ſmall bandage applied ſo as to preſs or bear againſt it, which drawing down the cartilage into its natural ſituation, affords preſent relief; and by this means, he ſays, ſometimes the cartilage re-eſtabliſhes itſelf entirely, and a perfect cure is effected. *Dionis* propoſes the applying two ſmall pieces of leather ſpread with an adhæſive plaſter, one upon the eyelid, and the other upon the forehead, (if the diſeaſe be in the ſuperior eyelid) and by means of little threads attached to theſe plaſters, to tye them together, with ſuch a degree of tightneſs, as to ſuſtain the eyelid in its natural ſituation.

If theſe means ſhould prove ineffectual, it is recommended to take off ſuch a portion of the relaxed ſkin of the eyelid, following the direction of its folds, as when the lips of the wound are brought together, will reſtore the cartilage to its natural ſituation: the lips of the wound are then to be brought in appoſition, and retained by three ſutures; one in the middle, and one at each end: a compreſs dipped in common water with a ſmall quantity of ſpirit of wine in it, is to be laid on the wound, and kept moiſt for four or five days, at the end of which time, ſays *St. Yves*, the diſeaſe is generally found to be cured.

Dionis alſo enumerates among the cauſes of this diſeaſe, a contraction of the internal membrane of the eyelid, which drawing the tarſus inwards, forces the eyelaſhes to preſent their points againſt the eye. In this caſe he recommends making a longitudinal inciſion into the membrane, in order to ſet it looſe, and allow of its elongating itſelf; by this means he ſays, the eyelaſhes will return into their place, and the eye be no more incommoded.

CHAP. V.

Ancyloblepharum.

THE Ancyloblepharum is a concretion of the eyelids with one another, or with the eye itſelf. It is injurious to viſion, and it alſo impedes the endeavour to direct the ſight to any particular object; for when the eyelid adheres to the eye, it deſtroys its mobility, ſo that it cannot be turned here and there: this adheſion is more particularly prejudicial to the ſight of diſtant objects, in the ſeeing of which, the elevation of the ſuperior eyelid greatly contributes; whereas, on the contrary, in the diſcernment of near objects, the eyelids wink, in order to keep out the greater light, which is reflected from objects near at hand. When the eyelids coaleſce with one another, they wink, and the rays of light are either totally or partially intercepted.

This diſeaſe is wont to ariſe whenever from the ſmall-pox, a burn, or any other cauſe, the eye and its lids have been exulcerated, and proper care has not been taken to prevent the parts from cohering. Children are alſo, not infrequently born with a union of the eyelids. In this caſe, if the ſuperior eyelid be drawn upwards, and the inferior downwards, the tarſi will open, and a fine pellicle, manifeſtly a continuation of the membrane lining the internal ſurface of the eyelid will be ſeen.

There is no other way of curing this diſeaſe but by dividing the agglutinated parts, and preventing their reunion afterwards. The ſurgeon, therefore, ſhould firſt examine whether the eyelids cohere entirely, or if there is not an aperture left in ſome part, which there moſt commonly is, at the greater or internal canthus of the eye next the noſe, owing poſſibly to the tears forcing their way out at this place. If the union of the eyelids be complete, and no opening left, an artificial one muſt be made, in which ever angle it can moſt conveniently be done, taking the utmoſt care not to injure the eye. Into this opening the ſurgeon is to introduce the blunt end of a probe, and to endeavour by means of that, without uſing much violence, to ſeparate the eyelids. But if that ſhould be found inadequate to the end deſigned, a very ſmall pair of ſciſſars, or little curved knife, with a probe point, muſt be introduced, with which the operator is, with the utmoſt care and exactneſs, to divide the eyelids. If the eyelids are not totally conjoined, the making an artificial opening will be unneceſſary; but the inſtruments are to be immediately introduced into the natural opening, and the eyelids are to be divided in the manner abovementioned. If the ſurgeon ſhould not happen to have an inſtrument, with a blunt or probe point, at hand, it will not be amiſs, leſt the eye ſhould be injured, firſt to introduce a ſmall director, and then carefully divide the eyelids upon that, with a ſmall pair of ſciſſars, knife, or launcet: or the operator may, as *Fabricius ab Aquapendente* recommends, arm the point of a common falcated, or curved knife, with a ſmall oblong button of white wax; and then paſſing it in at one canthus, carry it on, between the eye and eyelid, to the oppoſite canthus; where, after feeling on the outſide that the button is directed right, the point is to be puſhed through, and the eyelids divided.

When the eyelids have been thus ſeparated from each other, the ſurgeon muſt next very carefully examine with a probe, whether they adhere alſo to the eye itſelf. If they do, he muſt again free them cautiouſly with a probe pointed knife, or a blunt launcet, obſerving rather to wound the white of the eye than the eyelid. But when the whole globe, or the greater part of the eye is firmly attached to the lids, the operation is not only ſevere, but alſo extremely hazardous, as it will be very difficult to diſunite the eyelids from the *cornea* without wounding the *cornea*, and injuring, if not wholly deſtroying the ſight.

When the lids have been freed from the globe of the eye, the next buſineſs is to prevent them from adhering again, which they moſt probably will do, if not prevented by interpoſing ſome lint, or a very thin plate of lead, wax, or leather, or a piece of gold-beater's ſkin, cut in the ſhape of a half-moon and moiſtened with oil of ſweet almonds. Either of theſe are to be left ſeveral days in the eye, until there is no danger of future adheſions. But if the patient cannot bear the interpoſition of either of theſe ſubſtances, as is ſometimes the caſe, a collyrium, conſiſting of roſe water, tutty, and ſugar of lead, muſt be every now and then dropped into the eye; or the eye muſt be frequently ſprinkled with powder made of ſugar, pearls and crab ſtone; after which, the patient ſhould with his fingers gently rub, elevate, and work about his eyelids. Laſtly, the ſurgeon himſelf muſt, every now and then, paſs the blunt end of a probe betwixt the lids and the globe of the eye, to free and keep them from adheſions.

Fabricius Hildanus relates an inſtance of an adheſion of the ſuperior eyelid to the *conjunctive* and *cornea*, from a wound improperly managed, which he cured by paſſing, with the help of a bent probe, a ſilken thread in at one canthus, between the eye and the eyelid, and out at the other canthus, ſo as to encompaſs the adheſion: he then faſtened the two ends of the ſilken thread under the eye, and hung to it a piece of lead, of about a drachm weight: this leaden weight was ſuffered to hang looſe in the day-time, but at night was taken off, and the eye covered ſlightly up with a bandage. By this means, he ſays, the adheſion was completely divided within eight or nine days, and with ſcarcely any pain. *Platner* alſo recommends this method to be tried previous to the uſe of the knife.

When the eyelids are ſo glued together by a gummoſe or inſpiſſated matter, in the ſmallpox or inflammations in the eyes, that they cannot eaſily be opened, they ſhould never be forcibly pulled aſunder, but be firſt moiſtened a conſiderable time, with warm milk and water; by which means the patient will generally be able to open the eye himſelf ſoon after.

CHAP. VI.

Of the various Tubercles or Excreſcences obſerved on the Eyelids.

THE eyelids are liable to various ſpecies of preternatural tumors or tubercles, almoſt all of them of the encyſted kind, and are thought to derive their cyſt either from an injured and obſtructed gland, or from a fatty cell: they are ſometimes moveable, ſometimes fixed; ſome have a broad baſe, others a very ſlender ſtem; ſome give little or no uneaſineſs, others are very painful, troubleſome, and offenſive to viſion: they differ as to their contents, ſome holding a ſubſtance like a poultice, others like honey, and others ſuety; but whatever the matter be which they contain, the indication for cure is one and the ſame in all. The knife is almoſt always neceſſary, for they are very difficultly digeſted into a ſuppuration. Thoſe eſpecially which are recent, ſmall, moveable and ſoft, are cured more readily and ſafely by the knife: however in theſe, and all, one would not omit to try, firſt, the milder methods by reſolution or ſuppuration. Thoſe which have a ſmall ſlender root, may be taken off by ligature, in the compaſs of a few days: but the moſt immediate way is the cutting them off with a knife, binding it up, and healing it afterwards, as in other wounds. The means uſed in attempting to reſolve or ripen them are, digeſting plaſters, ſuch as the Empl. de ammoniaco, galbano, mercuriale, or by the more powerful application of diachylon with the gums, Cataplaſma maturans of the London pharmacopœia, or other cataplaſms. When matter is formed, the tumor is to be opened, making a ſufficiently large inciſion, to let it out: after this operation, whatever remains muſt be removed, together with the coat or cyſt, by ſome very powerful digeſtive medicament, or mild corrodent, ſuch as the red precipitate with alum, the unguent. ægyptiac. &c. for as often as the coat is left behind, and the abſceſs agglutinated or healed up, the old tumor ſprouts up again; but if neither of theſe anſwer the end, it muſt be extirpated.

The *Hordeolum* takes its name from ſome imagined reſemblance it has with a barley corn; it is a hard immoveable tumor, having ſcarcely any ſenſe, of the color of the ſkin, reddening but rarely, ſeated ſometimes cloſe to the outward ſkin, but oftener found hid in the interior part of the lid. It differs from other encyſted tubercles, as being attended with pain and inflammation, whence grievous pains ariſe, and an

impeded

impeded viſion. Suppuration ſometimes follows this inflammation.

The firſt intention of cure is to reſolve them, and to alleviate the pain: for this purpoſe we ſhould at firſt frequently anoint them with ſaliva, and after this apply a poultice made of roaſted apples, with a little camphire and ſaffron, in a ſoft linen cloth. The mucilage plaſter is alſo a good reſolvent. If theſe things prove ineffectual, and by a yellowiſh hue, they ſeem tending to ſuppuration, it would be proper to apply a plaſter of meal and honey, or of the diachylon with the gums, or ſome of the others mentioned above: but if a ſpeedier remedy be deſired, recourſe muſt be had to the knife.

The *Grando*, thought to reſemble hail, is in reality a *Hordeolum*, but harder, ſchirrous, and immoveable, growing on the inſide of the eyelid, and containing a pellucid body.

Chalazium is a certain moveable tubercle in the eyelid.

The *Verrucæ*, or warts, are not altogether unlike the other tumors mentioned of the eyelids; they are very unſightly, and greatly offenſive to viſion. They may be extirpated either by ligature, or by the knife, or by corroding medicaments, ſuch as the ſpirit of *ſal ammoniac*, or *lapis infernalis*. Some apply the blue vitriol ſtone, or even touch them gently with the oil of vitriol, carefully in all caſes guarding the ſurrounding parts. Actual cauteries are wholly to be avoided; and if they turn black or livid, there is generally danger of a cancer, and therefore it is better to forbear meddling with them.

Hydatids are tumors, ſo called, when like watery bubbles, or little bladders filled with water.

A *Steatoma* is that tumor which contains a fatty, or ſuetty ſubſtance withinſide.

An *Atheroma* when its contents are ſomething like a poultice of bread and milk.

A *Meliceris* when a ſubſtance like honey is found in the cyſt.

When theſe are ſmall, eſpecially the two laſt, they are called *ſtys*; when grown to a large ſize *wenns*; and in removing theſe by the knife, great regard is to be had to the magnitude and number of their blood veſſels before the operation, and afterwards to be ready with all proper

per applications for preventing a great effuſion of blood.

CHAP. VII.

A puſtulous Excoriation and Ulceration of the Eyelids.

THIS complaint is known by a ſenſe of weight in, and ſwelling of, the eyelids, accompanied with ſharp pains, continual itching, heat and redneſs in the angles, and membrana conjunctiva: the tarſi become excoriated and ulcerous, and diſcharge a glutinous matter, accompanied with corroding tears, and the eyelids are glued together during the night-time: alſo, ſmall miliary puſtules, ſometimes callous, like grains of ſand, beſet the internal ſurface of the eyelids: the patients complain of ſand being got into their eyes and pricking them, and by winking renew and keep up the inflammation, excoriation and ulceration. If the diſeaſe continues any length of time, the eyelid, more eſpecially the lower, becomes conſiderably enlarged, and is inverted, the tarſus projecting like a bow. This diſeaſe is ſtubborn, and very troubleſome.

When this complaint is recent, the inflammation is to be appeaſed, chiefly by bleeding, purging and other internal antiphlogiſtic remedies, and alſo by external applications.

Take of lily roots half an ounce, melilot or elder flowers one ounce, ſaffron one ſcruple; boil them in water; add ſix grains of ſal ammoniac, and a ſufficient quantity of flower to make it into a poultice. Let the eye be kept warm with this poultice, wrapped up in linen, and renewed twice a day until the tenſion goes off from the eyelids, and they become looſe and wrinkly, when aſtringent applications ſhould be made uſe of, ſuch as a decoction of red roſes, pomegranate rind, leaves of agrimony, with a little honey of roſes.

When this diſeaſe is of long ſtanding, we ſhould anoint the eyelids, morning and evening, with the following ointment.

Take of ſugar of lead one drachm, white lead four ſcruples, camphire ſix grains; rub them with a little oil of roſes, then add an ounce of ointment of tutty: but if the patient cannot bear this ointment, a merely lenient one of freſh butter, ſweet oil, and white wax, muſt be applied.

St. Yves, in ulcerated and ſcabby eyelids, makes uſe of an eyewater, compoſed of liver of antimony two drachms, tutty half an ounce, camphire half a drachm, cloves twenty grains; all which are to be infuſed for eight days in eyebright, fennel, celandine and rue waters, of each four ounces. This water is to be dropped into the eye three times a day, and the ointment of tutty to be applied in the evening. If this does not ſucceed, *St. Yves* recommends the application of the lapis infernalis to the little ulcers, uſing proper precautions to avoid injuring the eye.

If there is only a herpes in the eyelids, and no apparent ulcer, it will be ſufficient, to make uſe of, ſeveral times in a day, a waſh, made of ſugar of lead and ſal ammoniac, of each four grains, in eight ounces of roſe water.

CHAP. VIII.

Lippitudo. An immoderate diſcharge from the ciliary glands.

THE ciliary glands, in a ſound ſtate, ſeparate a ſmall quantity of unctuous fluid, for the purpoſes of preventing excoriation, which might otherwiſe happen by the continual ſtriking of one eyelid againſt the other, and of reſtraining the efflux and deviation of the tears. But it ſometimes happens, from diſeaſe, that this ſebaceous matter is ſecreted in too great a quantity, thereby diſturbing viſion, and gluing the eyelids together during ſleep. On waking the eyelids are obliged to be forcibly ſeparated, which is followed by an efflux of ſerous tears.

It is to be remedied by ſprinkling powder of tutty on the part in the evening, or by applying roſe water, in eight ounces of which twenty grains of white vitriol have been diſſolved, or by other deterſive and moderately aſtringent remedies.

CHAP. IX.

Epiphora. A watery Eye.

THE character of this is an involuntary efflux of ſerous tears, without any remarkable itching, pain, or heat: it often follows opthalmies of long duration, and is alſo occaſioned by immoderate ſtudy, eſpecially in perſons arrived at the age of fifty, when the ſight is diminiſhed, and objects, unleſs at a ſmall diſtance, cannot be diſcerned: as the winter comes on, it grows worſe, and is difficultly cured: in the mean time, if the patient abſtains from ſtudy, wind, ſmoak, ſalt foods and wine, and at the ſame time foments his eye at night, with an infuſion of four cloves in two ounces of brandy, this affection will be leſſened. But if the patient for ſo ſlight an inconvenience, is inclined to make uſe of cathartics, and bliſters to the neck, as authors adviſe, he may probably meet with more relief. There is another ſpecies of epiphora, accompanied with heat, itching, redneſs and pain of the eye; but this is never found otherwiſe than as a ſymptomatic affection.

C H A P. X.

Cancer of the Eyelids.

THIS diſcharge is diſtinguiſhed by a hard and ſhooting tumor, often exulcerated, of the eyelids. *St. Yves* has obſerved five varieties of this diſeaſe.

In the firſt variety, a hard tumor grows to the ſuperior eyelid, with blood veſſels at its baſe, turgid, and of a lead color, and at intervals attended with lancing pains.

In the ſecond, a wart adheres to the inner angle of the eye, below the commiſſure of the eyelids: its roots are deep, and it is covered with blood veſſels divided into granulated packets, which bleed upon the ſlighteſt preſſure: this tumor itches ſo exceſſively, that the patient can hardly refrain from ſcratching it, from whence a cancerous ulcer quickly branches forth.

In the third, the blood veſſels are varicous, and of a lead color, without any antecedent wart or tumor: but in theſe three varieties, in proceſs of time, an exulceration comes on, with fungous fleſh, which afterwards waſting away of its own accord, the ulcer is left to diffuſe itſelf more and more over the other parts of the face.

The fourth begins with an epiphora, or acrid tears, exulcerating the lachrymal caruncle, and afterwards corroding the inferior eyelid, whoſe margins from thence become callous. Sometimes a fiſtula lachrymalis precedes this diſeaſe.

The fifth is not unfrequently occaſioned by a blow upon the eye, by which the veſſels are contuſed, and the blood, before vitiated by a cancerous acrimony, is altered, and thus a cancerous and callous ulcer ſoon follows.

All theſe varieties, except the ſecond, admit not of a *radical* cure: but the *palliative* cure requires a milk diet, cooling, diluent regimen, warm fomentations, and acidulated waters. Amongſt a number of external applications, frogs ſpawn water, garden night-ſhade water, or ſome ſimple diſtilled water, with a few grains of ſugar of lead diſſolved in it, have obtained credit.

CHAP. XI.

Encanthis.

AN Encanthis is a fleſhy tubercle ariſing in the greater angle of the eye, and is ſeated either upon the *caruncula lachrymalis*, or the *valvula ſemilunaris.* This tumor ſometimes increaſes to ſuch a degree, as not only to cover the puncta lachrymalia, but alſo the greateſt part of the pupil. When this is the caſe, the tears flow continually over the cheeks, the eyes are inflamed, the face is remarkably disfigured, and viſion itſelf greatly impeded.

There are two ſpecies of encanthis: one of which is milder, and unaccompanied with pain or hardneſs; and another, more obſtinate and malignant, and which is attended with pain and lividneſs, and has in ſome ſort a cancerous aſpect.

In the milder ſpecies of encanthis, frequent ſcarifications, and mild eſcharotics, are generally of great ſervice in the beginning. *Heiſter* recommends as the beſt and mildeſt corroſive, a powder conſiſting of canary ſugar, four parts, and white vitriol, one part, or burnt alum, a fifth part. This powder is to be ſprinkled gently and cautiouſly, every now and then, upon the tumor; and a little while after, the eye ſhould be waſhed clean with warm water. The tumor is to be thus ſprinkled, until it is entirely deſtroyed. If we gain but little ground by this, the lapis infernalis may be uſed now and then, but with the utmoſt caution.

If theſe medicaments ſhould avail nothing towards the reduction of the fungous fleſh, we muſt have recourſe to exciſion; in which caſe the excreſcence ſhould be laid hold of with a hook, or transfixed with a ſilken thread, by the intervention of a needle, that the extirpation may be accompliſhed with a knife or ſciſſars. The greateſt care is here neceſſary, to avoid injuring the eye itſelf, or the caruncula lachrymalis. As the lachrymal caruncule preſerves a cavity for the reception of the tears, which would otherwiſe flow out upon the cheeks, the conſequence of injuring that, would be a weeping eye ever after. It is better therefore to leave a portion behind, and remove it afterwards by corroſives, or the knife, than run the riſque of taking away too much.

When the encanthis is of the more obſtinate ſort, and already tending to a cancer, it is better to omit the operation, and the uſe of corodents, leſt they ſhould exaſperate it, and only make uſe of drying, cooling, and lenient collyria, or ointments.

Fleſhy tubercles or excreſcences, not altogether unlike the encanthis, ſometimes grow out from the internal ſurface of the eyelid: they are very ſmall in their beginning, but gradually increaſe, and ſometimes attain to a conſiderable ſize. They are deſtroyed either by the lapis infernalis, or the knife, treating the wound afterwards with a collyrium of aloes, tutty, and ſugar of lead in roſe water.

C H A P. XII.

Unguis, Pterygium, or Pannus. Nail or Web of the Eye.

THE *Unguis*, or *Pterygium*, as it is called by the Greeks, is a thin, whitiſh, membranous excreſcence, growing out moſt commonly from one of the angles of the eye, and frequently extending itſelf ſo far over the cornea and pupil as to obſtruct the ſight. It is ſometimes full of reddiſh turgid veins, appearing to be nothing elſe but a congeries of blood veſſels; and then it is uſually called *pannus*, or *panniculus*. It generally ariſes from the naſal or greater canthus of the eye, being a production of the membrana ſemilunaris; ſometimes from the leſſer canthus; and now and then, though very ſeldom, from one or other of the eyelids. Sometimes it adheres only ſlightly, by means of a few ſlender fibrils, to the cornea; and at other times it covers the whole eye, and coheres ſtrongly with it, which renders the cure extremely difficult.

If there ſhould be any inflammation of the eye, we ſhould endeavour to ſubdue that, before we proceed any further, by bleeding, purging, bliſtering, and other applications effectual to this purpoſe. When the unguis or pannus is recent, and as yet but thin and ſoft, it may ſometimes be diſcuſſed by mild catheretics: a drachm of canary ſugar, and four or ſix grains of white vitriol, or burnt alum, or even verdigreaſe mixed together and finely powdered, is an excellent medicament for this purpoſe, ſays *Heiſter*, if very cautiouſly ſprinkled now and then upon the miſchievous membrane, either with the fingers, or by means of a quill. *Heiſter* alſo recommends viper's fat, the gaul of the lamprey, freſh butter with a ſmall quantity of white vitriol in it, or half a ſcruple of white vitriol diſſolved in two ounces of the greater celandine water; particularly for infants, to whom it is very difficult to apply a powder. *St. Yves* recommends a ſolution of the lapis divinus*, or lapis medicamentoſus, in common water.

If theſe means prove inadequate to the cure, recourſe muſt be had to exciſion; in order to which the ſurgeon muſt paſs a ſmall hook underneath that part of the unguis which is the leaſt adherent to the eye, and elevate it a little; after which he is to paſs a needle and ligature through the unguis, and make a double knot upon it; then joining the ends of the thread in form of a loop, he is gently to raiſe the unguis up; which being done, he muſt, with a lancet, ſo divide the ſuperior and inferior part of the membrane, covering the unguis, as that introducing a ſtrait and ſmall pair of ſcizzars underneath, he may have it in his power to cut it off, as expeditiouſly as poſſible, cloſe to the caruncula lachrymalis; he is then to draw back the ligature with the membrane towards the cornea, and if the unguis adheres any where to the eye, he is to free it, by degrees, with a lancet or ſciſſars.

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* The lapis divinus is compoſed of equal parts of alum, nitre, and blue vitriol, melted together in a glazed earthen veſſel, afterwards adding a little camphor.

In the performance of this operation, three things are chiefly to be regarded: firſt, in dividing of the membrane cloſe to the caruncula lachrymalis, to be particularly careful not to remove any part, much leſs the whole, of the caruncle; for if this body, which ſerves to ſtop and direct the lachrymal fluid into the puncta lachrymalia, be wanting, the patient will be troubled with a watry eye ever after: ſecondly, to avoid wounding the eye: thirdly, to leave no part of the unguis behind, from which the diſeaſe might be reproduced: nevertheleſs it is better to leave a little of the unguis remaining behind, when ſtrongly cohering with the cornea, than from too ſolicitous an attention to the complete detachment of it, to run the riſque of wounding the cornea, from which incurable ſcars might enſue.

St. Yves adviſes the application of brandy and water to the eye, for the firſt four days after the operation; and afterwards, for the cicatriſing of the wound, a ſolution of the lapis divinus in common water. If any of the unguis ſhould have been left behind, it muſt be treated with mild corroſives, ſuch as are abovementioned.

Theſe little membranes may ſometimes be removed by a ſimple diviſion of their veſſels near to the carunucula lachrymalis; eſpecially when they appear full of red, large bloodveſſels, running from the greater angle to the cornea; for being thus deprived of their nutriment, they gradually decay, or at leaſt are more eaſily removed by medicaments.

Sometimes the cornea is incruſted over with a glutinous kind of matter like fat, or a little membrane, which may be readily taken off with the gaul of an eel, lamprey, or ſome other gall of the ſame nature.

Sometimes alſo theſe membranes are hard, unequal, blackiſh, turned back, and accompanied with violent pains communicating with the temples; in this caſe, as they are of a cancerous nature, no operation ſhould be performed, or irritating topics made uſe of: all that can be done is to palliate by means of cooling, anodyne collyria, alterative medicines, and a proper regimen with regard to diet.

When the unguis covers the whole eye, *St. Yves* adviſes us to divide it into four parts, and operate upon each part ſingly, in the manner abovementioned.

C H A P. XIII.

Fiſtula Lachrymalis.

WE have ſeen, p. 15, 16, 17, and 18, that the lachrymal fluid, after anſwering the purpoſes of its ſecretion, is tranſmitted to the great canthus of the eye, from thence through the *puncta lachrymalia*, by two little canals, into the *lachrymal ſac*, and from thence through the *ductus ad nares* into the noſe. Now this is what happens in a natural and undiſeaſed ſtate: but if from any cauſe an obſtruction takes place, ſo that the tears cannot paſs freely from the ſac into the noſe, they will of courſe accumulate in the ſac, and dilate it; part will either ſpontaneouſly, or upon preſſure, regurgitate through the puncta, and the diſorder commonly called a fiſtula lachrymalis will be produced.

There are various cauſes which may prevent the tranſmiſſion of the tears through the lachrymal paſſages: thus ſometimes an inſpiſſated humor lodges in and blocks them up, or a polypus which fills the whole noſtril, oppoſes itſelf to the diſcharge from the duct. But the moſt common ſource of this diſeaſe, is an inflammation and ſwelling of the membrane lining the ſac and duct, happening frequently after the ſmall-pox and opthalmies, by which means the paſſage becomes compreſſed and ſtraightened, and the flow of tears through it thereby reſtrained. *Platner* obſerves alſo, that thoſe who have flat and depreſſed noſtrils are more obnoxious to this diſorder.

We may know that the paſſage is obſtructed from ſome cauſe or other, by a dilatation and external ſwelling of the ſac, ariſing from the detention and accumulation of its contents; a humor mixed with mucus is diſcharged through the puncta lachrymalia into the eye, which is perpetually watery. This diſcharge is made more frequently if the patient coughs or ſneezes, and may likewiſe be forced out, by preſſing a little forcibly with the finger on the outſide of the ſac, at which time the tumor ſubſides. If the diſeaſe has proceeded no farther, it is unaccompanied with pain, diſcoloration of the ſkin, or any other inconvenience, than what reſults from the diſcharge through the puncta, and the trickling of the lymph down the cheeks. This diſtenſion and reſolution of the lachrymal ſac, is by ſome called a *lachrymal hernia* ; *Anell* gives it the name of *dropſy* of the *lachrymal ſac.*

In this ſtate of the diſeaſe the remedies are, the injection of ſome thin, mild fluid, through one of the puncta into the ſac, by means of *Anell*'s ſyringe*, preſſure to be occaſionally made by one of the fingers on the ſac, in order to evacuate its contents, and a moderately cooling

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* Monſ. Anell alſo invented a fine ſilver probe not thicker than a hog's briſtle, to be introduced, previous to the uſe of the ſyringe, through one of the puncta, ſac, and duct, into the noſe, in order to remove and diſſipate any obſtruction that it might meet with in its paſſage. He relates the hiſtory of many cures which he has performed with theſe inſtruments, and he aſſures us, that this method is ſufficient for the cure of all the diſeaſes of the lachrymal paſſages. But it is objected to the probe, that its ſmall ſize, neceſſary flexibility, and very little reſiſtance it is capable of making, render it unequal to the taſk aſſigned, and that the quick ſenſation of the parts, and their diſeaſed ſtate, make the attempt improper and miſchievous. See Pott on fiſtul. lachrym. p. 34, 34. *Heiſter* is laviſh in his commendations of Anell's method, and aſſerts the having cured numbers by it, and he thinks there is hardly any fiſtula lachrymalis ſo obſtinate, that will not yield to this method, provided it be not accompanied with caries or callus ; nay, he even mentions one inſtance, where there was a ſlight caries, which was cured by a perſeverance in this method. " *Intera nulla* " *fere tam pertinax lachrymalis fiſtula deprehenditur, quin ex-*

" *tirpari*

and aſtringent collyrium occaſionally uſed; not neglecting, if there ſhould be occaſion, the uſe

" *tirpari per hactenus explicata* Anelii *artificia poſſit: dumo-*
" *do caries atque callus abſuerint. Quin agomet non ſæpiſſime*
" *tantum fiſtulas ejuſmodi qnam minimo temporis ſpatio, hoc eſt,*
" *intra tres quatuor ſe dies felicitur iſtac ratione curavi; ſed*
" *ſingulari quoque experimento didici, poſſe vel ad ipſas etiam*
" *caries mitiores* Anelianam *iſtam* methodum *hand prorſus*
" *aniter adhiberi. Sic enim, anno* 1727, *puellam quandam,*
" *undecim annos habentem, per ſex circiter menſes continuato*
" *quotidie injectionis opere, felicitur ab ejuſmodi fiſtula veteri*
" *& carie mitiori donata, me liberare memini; quæ nunc ad-*
" *huc bene valet & matrimonium iniit.*" Heiſter, p. 580. But he acknowledges, that a thorough knowledge of the parts, a ſharp and clear eyeſight, together with a ſteady and dextrous hand, are particularly requiſite for thoſe who uſe Anell's inſtruments, and that they will ſucceed difficultly with thoſe who are not poſſeſſed of thoſe requiſites.

Platner, after recommending the probe and ſyringe as a cure for an incipient fiſtula lachrymalis, has theſe words: " *Hanc curandi rationem, quam plures contemnunt,*
" *experiri in his caſibus decet, cum ea raro, & vix, niſi minus*
" *peritos atque parum exercitatos, fallat. Nec tam acerbos*
" *dolores excitat, ſi provide & ea adhibita diligentia ſpecillum*
" *dimittitur, ne id itinera, per que fertur convulneret. Si*
" *etiam quandoque res minus ſuccedit, id quod in hominibus*
" *naſum ſimum ac valde depreſſum habentibus, evenire poteſt*
" *eam nulla pericula circumſtant. Nec tamen hanc curationem*
" *experiri convenit, ſi corpus ægrum ac mali habitus eſt, &*
" *niſi prius opthalmia, ozæna, aliuſve morbus, exquo hoc vi-*
" *tium enatum fuit, omnis fuit remotus.*" Platner Chirurg.

of cathartics, bleeding, bliſters, and other uſeful medicaments, that the habit of the patient, and the different circumſtances of the caſe may require, together with a careful regimen of life and diet.

By theſe means we are told, that the diſorder may be partly, if not wholly ſubdued, ſo as that the patient will be able to live for a length of time, if not always, without having recourſe to a more troubleſome and painful proceſs. But if theſe remedies ſhould prove inſufficient, we muſt proceed as in the next ſtage of the diſorder.

Sometimes an inflammation ſupervenes, in which caſe there is an evident increaſe of the tumor, accompanied wirh heat, redneſs, pain and tenſion, and a fluid of a purulent appearance is diſcharged through the puncta: if no relief is had, the inflammation and ſwelling increaſe, and at laſt, the integuments being incapable of any farther diſtenſion, burſt, and a puriſom diſcharge emerges through the aperture: the tumor then ſubſides, the patient becomes eaſy from the ſtretch of the parts being taken off, and the diſcharge which uſed to iſſue through the puncta, now flows through the new aperture.

In this caſe, it becomes neceſſary for the lachrymal ſac to be laid open, and if we are called in time enough, it ſhould be performed before the burſting of the integuments: the inciſion is to be made with a ſmall round pointed knife, and is to be carried from the upper part of the tumor to the lower, quite down into the cavity of the ſac, taking care not to divide the juncture of the eye-lids; the wound is then to be dilated either with dry lint, or a bit of prepared ſpunge, in order to aſcertain the ſtate of the ſac and duct; and if theſe ſhould be found diſeaſed, we are to dreſs the wound ſuperficially, make uſe of moderate preſſure externally, and ſuffer the ſore to heal up, that by theſe means the integuments may contract, and the ſac become leſſened.

If this ſimple method does not ſucceed, or from the ſtate of the parts ſeems unlikely to do ſo, Mr. *Pott* tells us another muſt be tried, by which we are to aim at rendering the naſal duct pervious to the lachrymal fluid: to obtain this end he ſays we are to endeavor very gradually to dilate the lachrymal duct; by paſſing either a probe, or a piece of catgut, or a bougie gently into it, as far as it will eaſily go, and repeating it occaſionally until it is got quite through, and the paſſage is free. When a paſſage has been once obtained, he directs us to keep it carefully open, either by a piece of catgut, a ſmall bougie, a leaden probe, or ſomething of that ſort; and when it is thoroughly eſtabliſhed, he ſays the ſore may be permitted to contract, until it becomes no more than what ſerves for the introduction of the bougie into the duct; in this ſtate he thinks it ſhould be kept open for ſome time, injecting now and then a little aqua calcis, ſoftened with mel roſar. through from above into the noſe; and when it appears, that the paſſage is ſo free, and ſo well eſtabliſhed, that there is good probability of its preſerving itſelf, he directs us to dreſs the wound ſuperficially, make uſe of moderate preſſure on the ſac, and ſuffer the wound to cloſe up.

But if this method does not ſucceed, or the bones ſhould be carious, the only reſource we have left, is the forming of a new and artificial paſſage for the lachrymal fluid to be conveyed through from the ſac to the noſtril, by the perforation of the os unguis; this may be performed with a ſtrong probe, gimblet, drill, perforator of a trepan, curved trocar, or any other inſtrument, which like an awl, has a ſharp point of a moderate thickneſs, and will perforate the os unguis without widely breaking or ſhivering it.

The inſtrument is to be carried in a certain direction, leſt it ſhould arrive at the anterior proceſs of the maxillary bone, or the plain part of the os ethmoides. It is alſo to be ſo inclined, as that it may be driven obliquely downwards, inwards, and backwards, as there is danger of its injuring the ſeptum naſi, and ſpongious bones of the noſtrils. If the inſtrument is carried directly downwards, it may get into the maxillary ſinus. The bone is known to be pierced if a little blood diſtills from the noſtril.

After the perforation is made, if there ſhould be any ſharp ſplinters broke off, they ſhould be immediately taken out, and the wound cleanſed with rags and a ſponge. Alſo, when a perfect paſſage to the noſtril is thus obtained, we muſt take care to preſerve it, as the growing fleſh and callus are wont, unleſs they are repreſſed, to fill it up in a ſhort time. There are various methods of treatment for this purpoſe: ſome paſs a pipe of gold, ſilver, or lead, into the new-made aperture, that it may reſt upon the bone; others introduce a tent, a ſmall bougie, or piece of wood of a conical form, and ſuffer it to remain until the edges of the aperture in the bone are become callous all around. If a golden, ſilver, or leaden pipe, is paſſed in, the ſore may be digeſted and healed over it; and *Heiſter* ſays, that when a pipe is thus left in, it creates ſo little uneaſineſs to the patient, that ſome have not known he had left any thing in. He alſo adviſes, a day after the edges of the wound have been brought together, the injection of dec. veronicæ through one of the puncta with *Anell's* ſyringe, and repeated ſeveral times a day, that thus a way may be ſhewn for the tears through the tube. But when a ſmall bit of wood or bougie is made uſe of, the wound is to be kept open until the edges of the foramen are become thoroughly callous. If an inflammation is excited in the eye, the moſt effectual remedies ſhould be uſed to ſubdue it.

Mr. *Pott's* directions for the treatment, after the making this new paſſage, are as follow: "As ſoon as the perforation is made, a tent of "lint ſhould be introduced of ſuch ſize as to fill "the aperture, and ſo long as to paſs through "it into the cavity of the noſe; this ſhould be "permitted to remain in two three, or four "days, until the ſuppuration of the parts renders

“ ders its extraction eaſy, and after that a “ freſh one ſhould be paſſed every day, until “ the clean granulating appearance of the ſore “ makes it probable, that the edges of the “ divided membrane are in the ſame ſtate: the “ buſineſs now is to prevent the incarnation “ from cloſing the orifice, for which purpoſe “ the end of the tent may be moiſtened with “ ſpir. vitriol. ten. or a piece of lunar cau“ſtic ſo included in a quill, as to leave little “ more than the extremity naked, may at each “ dreſſing, or every other, or every third day “ be introduced, by which the granulation will “ be repreſſed, and the opening maintained; and “ when this has been done for ſome little time, “ a piece of bougie of proper ſize, or a leaden “ canula may be introduced inſtead of the tent, “ and leaving off all other dreſſing, the ſore “ may be ſuffered to contract as much as the “ bougie will permit, which ſhould be of ſuch “ length, that one extremity of it may lie level “ with the ſkin in the corner of the eye, and the “ other be within the noſe.”

“ The longer time the patient can be pre“vailed upon to wear the bougie, the more “ likely will be the continuance of the opening; “ and when it is withdrawn, the external orifice

“ ſhould be covered only by a ſuperficial
“ pledget, or plaſter, and ſuffered to heal under
“ moderate preſſure.”

The puncta lachrymalia require a particular animadverſion. They appear to have a very ſmall cartilaginous ring, by which means they are always open, and receive the humor. Theſe puncta are covered by a very tender membrane, which ſometimes, if no humor diſtils to theſe paſſages, is dried, and the puncta are blinded. This happens more frequently to glaſs-makers, who form glaſs into various ſhapes by a furnace, and to others who burn and boil metals of different kinds, by a very ſtrong fire. For all the humor accuſtomed to diſtil through thoſe paſſages is evaporated by the fire, ſo that there is danger, leſt from theſe puncta being ſhut up, the eyes ſhould be watery ever after. However, there is a cure mentioned for this diſeaſe: an opening is to be made into the lachrymal ſac, and a ſmall blunt probe with a round head is to be firſt introduced, but afterwards another with a ſharp point, which is to be puſhed upwards, and towards theſe puncta, until it goes out through the puncta. The paſſage being again ſet free, is to be kept open by frequently paſſing the blunt probe through it.

CHAP. XIV.

OPHTHALMY.

Of the Ophthalmy in general.

IT is known by pain, redneſs and weeping of the eye, together with an impatience and inability to bear the light.

Pain in the eyes is in proportion to the ſenſibility of this organ, which is very great; for no part of equal bulk receives ſo many nervous filaments as the eye. Its filaments are derived from ſix pair of nerves, and ſenſibility is in proportion to the quantity of nerves within a given ſpace, ſuppoſing the ſtretch of the nervous threads to be equal.

The pain is accompanied with redneſs, heat, tenſion, ſwelling; which are all produced by a preternatural influx of blood into the veſſels of the eye.

The inability of bearing the light, infers an increaſed ſenſibility of the retina, whether it is owing to an inflammatory fullneſs of it, or the choroid, and its uveous expanſion being too much on the ſtretch, or whether the ſclerotic alſo contributes: in all theſe caſes, there is a *myoſis* or contraction of the pupil, according to the degree of this uneaſineſs, produced by the rays of light.

The abundant flux of tears is owing to the irritation produced by the pain, dryneſs and heat of the eye, nature intending that ſecretion, to waſh away any extraneous body that may chance to be there, to moiſten what is dry, and to attemperate what is hot and acrid. From hence it may be underſtood why the tears are ſecreted faſter than they can be reabſorbed by the lachrymal points, and therefore flow down over the cheeks.

The ſpurious Ophthalmy.

This ſpecies is the ſlighteſt of all, having no internal pre-exiſtent fault for its cauſe, and takes its riſe from ſome accidental and external circumſtance, as ſmoke, wind, duſt, immoderate reading, labour of the eyes in the examination of minute objects, the ſteam of onions, garlic, &c.

It is cured by the aſſiſtance either of nature or art: nature, for inſtance, waſhes out the duſt or acrid particle by means of the tears; appeaſes the pain ariſing from the light, by ſhutting the eyelids in the day time. The medical art, in imitation of nature, ſpreads a ſhade of green ſilk, dictates the excluſion of light and wind, calls for warm water to waſh the eye with, and forbids any attempt to read or work, eſpecially at night. If any thing ſhould ſtick in the eyes, or between the eyelid and the eye, it ſhould be extracted, by opening the eyelids and introducing a feather, bit of paper, the end of a probe armed with fine lint, a ſmall hog's briſtle turned and bent into the form of a loop, or the corner of a ſilk handkerchief.

The dry Ophthalmy:

In this ſpecies there is no tumor in the eyelids, but a redneſs and itching only in the tarſi; there are ſcarcely any tears, the eyelids are glued together in the night time, and light reflected from water is ſcarcely to be borne. It is cured more eaſily than the moiſt ophthalmy; nevertheleſs it is ſometimes obſtinate and habitual, in which caſe it is cheriſhed by the acrimony of the humors.

The cure requires bleeding, which is frequently ſufficient; but what ſucceeds beſt of all is, after the uſe of cathartics, warm bathing, repeated for ſome days; and on coming out of the bath, ſome cooling apozem or ſweet whey is to be adminiſtered. At night, anodynes are of ſervice, eſpecially to children, as *Sydenham* obſerves. And in the ſummer the chalybeat waters ſhould be drank for ſeveral days.

The external applications proper to be uſed, are waſhes made of ſimple diſtilled waters, with a ſmall quantity of brandy, or of ſugar of lead, or white vitriol. *St. Yves* preſcribes a waſh made with roſe and plantain waters, of each two ounces, tutty, twelve grains, and a ſpoonful of ſpirit of wine: with this the eye is to be fomented during the day, but at night a compreſs, dipped in a decoction of the leaves of ſpeedwell, thyme and roſes, made in red wine, is to be applied: ſlices of a pear or apple frequently renewed, are very uſeful in mitigating the pain.

The moiſt Ophthalmy.

This as well as the dry ophthalmy is frequently habitual, or has its ſource in the maſs of blood, from which circumſtance it is difficult of cure. It is known by the abundance of tears, ſwelling of the eyelids about the tarſi, increaſed ſecretion of the ſebaceous humor from the ciliary glands, launcing pains in the eye, inſufferance of light, redneſs of the eye, with an impoſſibility of ſeparating the eyelids: from thence follow ſpots, and ſometimes ulcers on the cornea. Frequently, in children, the cheeks are excoriated by the tears, and the noſe and lips, on account of the prone and inclined ſituation of the head, become ſwelled.

The remedies conſiſt of bleeding from the arm, foot and neck, and alſo three or four leeches applied contiguous to the eye. A common purge, conſiſting of ſenna, manna and tamarinds, is to be given. Antiphlogiſtic diluents are to be uſed. At night a paregoric ſhould be taken. A large bliſter ſhould alſo be applied between the ſhoulders; or a ſeton or iſſue cut; or in children we ſhould excite a diſcharge from the ears, and keep it running, to make a revulſion of the acrid ſerum from the eyes. Purging is alſo to be repeated, and then warm bathing may be uſed, unleſs the ſtate of the tongue and ſtomach ſhould forbid it.

In the mean time the mildeſt applications, ſuch as the pulp of an apple boiled in milk,

milk itſelf newly drawn, mucilage of fleabane or quince ſeeds, the white of an egg mixed with roſe water, or what is better, becauſe it does not glue up the eyes, the white of an egg thickened by a little powdered alum, and wrapped up in a linen cloth, the white of an egg boiled hard, and cut in half, and then ſprinkled with roſe water, and alſo roſe water with a little ſugar of lead, are to be uſed. The pain being appeaſed, the quantity of a very ſmall pea of ſome mild ointment, ſhould be introduced at night, between the eyelids, by which means the gluing together of them by the diſcharge, will be in a great meaſure prevented.

If when the flux of water has ceaſed, there ſhould remain any ulcer upon the cornea, it muſt be treated as directed under the head of ulcers of the cornea.

Laſtly, when this ophthalmy becomes inveterate, the white or roman vitriol ought to be diſſolved in clear water, in ſuch a proportion, that when a drop is poured into the eye, it may excite a vivid but momentary pain: thus a ſcruple of vitriol in ſix ounces of water, with a drachm of ſugar, cauſes this effect: this waſh ſhould be dropped in when going to bed, nor is the eye to be burthened with bandage or compreſs. In the morning the eye ſhould be bathed with warm ſimple or roſe water.

There are ſome who add three grains of verdigreaſe to the vitriol, or make uſe of wine in which copper money has been infuſed for a night, or who infuſe the lapis divinus in water, and pour ſome drops of it into the eye in the evening, all which collyria have a happy effect, provided the humor has been corrected by proper remedies.

The Chemoſis Ophthalmy.

The chemoſis ophthalmy ariſes either from an external cauſe, as a violent contuſion of the eye, from whence an echymoſis; a chirurgical operation performed upon the eye, as the operation for the cataract, unguis, &c. or elſe it has an internal cauſe, as a tranſlation or critical depoſition, or a violent cold in bad habits.

The character of this ophthalmy is, a blackiſh red, ſwelling of the conjunctiva, which riſes equal to a finger's breadth, with a depreſſion and obſcurity of the cornea, which ſeems to lay hid in a pit. The inflammation is very great, with dreadful pains of the eye and head, ſenſe of weight over the orbit, watchings, fever, throbbing, ſwelling and cloſure of the eyelids. It is terminated ſometimes by a ſuppuration of the eye, from whence an incurable blindneſs: at leaſt it is followed by a lencoma or ſpeck on the cornea.

This diſeaſe is to the eye, what the pleuriſy is to the cheſt, and the blood in the porringer is covered with a coriaceous or leather like cruſt, the ſame as in an inflammation of the pleura*.

Nothing is more efficacious in the beginning, than repeated bleedings from the arm, foot and neck, and ſometimes a few leeches applied to the eyelids themſelves: ſome even adviſe ſcarifications of the eye. Cathartics, conſiſting of an infuſion of two drachms of ſenna leaves, one drachm of rhubarb, and an ounce of manna, or even a ſtronger of ſcammony, &c. may be given with conſiderable advantage. A bliſter ſhould alſo be applied between the ſhoulders, and glyſters occaſionally adminiſtered. Diacodium or laudanum ſhould be given at night, in order to procure ſleep. The diet ſhould be cooling, diluting, light and eaſy of digeſtion.

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* *St. Yves* mentions a caſe of a lady in a pleuriſy, who not being bled, was attacked with this ſpecies of ophthalmy, upon which her pleuriſy ceaſed, but the fever continuing, with an inflammation of the eye, the ſuppuration quickly came on. The other was attacked in twenty days after with the ſame accidents, and with as much violence, but had a happier event, a lencoma only being left behind.

In the mean while, the eye, at the beginning, ſhould be fomented with warm milk, chickens blood, or a weak decoction of white poppy heads and mallow flowers. The common poultices are to be avoided, as they offend by their weight and preſſure; but the application of the warm pulp of an apple boiled in milk, may be uſed with advantage. Afterwards, if the ſwelling of the eyelids and tunica conjunctiva ſubſides, and the lividneſs and diminution of pain indicate it, reſolvent applications, as wine, brandy, or even camphorated ſpirits, diluted with roſe water, are to be uſed.

If there are ſigns of ſuppuration, the aſſiſtance of a ſurgeon will be neceſſary to evacuate the matter, and heal the wound: but if a ſynchyſis or effuſion of the vitreous humor ſhould ſupervene, an artificial eye muſt be placed in the room of the natural one, that at leaſt deformity may be avoided.

The puſtulous Opthalmy.

In this ſpecies, little packets of red veſſels run from the internal coat of the eyelid even to the cornea, on the edge of which a ſmall puſtule ariſes: but if the puſtule be ſeated on the cornea itſelf, matter forming there, will be diſcovered by its whiteneſs.

The cure conſiſts in the application of a ſolution of the lapis divinus in water, to the puſtules: but if matter has formed on the cornea, the abſceſs ſhould be opened with the point of a launcet, and afterwards touched with the ſame ſolution.

The Eryſpelatous Ophthalmy.

In this, beſides a redneſs of the conjunctive, tumor of the eyelids, with intolerable pains of the eye and head, and with very great heat, ſcabby incruſtations, and branny ſcales break out in the forehead, temples, and noſe, which when healed, leave ſcars behind. This diſeaſe is ſtubborn and difficult of cure.

The treatment of this requires firſt, a fomentation of elder flower water, with a tenth part ſpirit of wine; ſecondly, after repeated bleeding and purging, a ſeton cut in the nape of the neck, and alſo bliſters applied between the ſhoulder-blades, or behind the ears. If the pains continue violent, bleeding is to be repeated, and narcotics are to be made uſe of.

The Scrophulous Ophthalmy.

This is common to ſcrophulous children, and is frequently of the moiſt kind. The margins of the eyelids are ſwelled, and generally covered with a glutinous humor; the conjunctive is red, and ſomewhat ſwelled; and the tears are acrid. The little patients hang their heads downwards; the noſe, lips, and neck are puffed up, and ſomewhat ſwelled; and the cornea is very frequently rendered opake by a white ſpot.

The ſource of this diſeaſe is a ſcrophulous, viſcid and acrid humor, which it is neceſſary to correct; by proper diluents, and if poſſible to evacuate. This to be attempted by mercurial purges, frequently repeated at proper intervals. At the ſame time, aperient liquors, in which millepedes and ſteel filings have been infuſed, are to be uſed as common drink. The expreſſed juice of clivers in the quantity of one, two, three, or more ounces, according to the age of the patient, may alſo be given in a morning, two or three times a week, in the intervals of the purging medicines. A good diet drink may be made by boiling a few ounces of dock roots, in ten pints of water, till reduced to five, adding four or five handfuls of cypreſs tops, at the end. In ſome caſes, inſtead of mercurial purges, ten, twenty or more grains, according to the age of the patient, of æthiops mineral may be given every morning, interpoſing a purge every third or fourth day. Sea bathing, at proper ſeaſons, will generally be attended with very great advantage. But above all, whenever the diſeaſe appears obſtinate, a ſeton ſhould be immediately made in the neck, and kept open for a conſiderable length of time.

With reſpect to topical applications, Sir *Hans Sloane*'s remedy appears well ſuited to this diſeaſe: it is an ointment prepared with vipers fat and tutty, with which the margins of the eyelids are to be beſmeared night and morning, at the ſame time applying a large bliſter to the neck,

neck; eſpecially if no ſeton has been previouſly made. When the inflammation is abated, reſvolvent waſhes may alſo be uſed.

The Venereal Ophthalmy.

This may be divided into two varieties, viz. The *tranſlative* and *ſymptomatic*: both depend upon the venereal virus, and grow worſe towards night.

The ſymptomatic remits towards morning, never turns into a chemoſis, the morbid matter does not change place, the pains are milder, it is removed when the lues is cured, and is alſo attended with leſs danger.

The tranſlative ophthalmy does not remit towards morning, terminates always in a chemoſis, the morbific matter changes place, the pains are more violent, it remains after the lues is cured, and is more dangerous.

The increaſe of pain, heat, and redneſs when in bed, the reſiſtance to the common, and yielding to antivenereal remedies, are to be attributed to the venereal poiſon. It is very like the moiſt and chemoſis ophthalmies, with this exception, that in the venereal, the conjunctive is as it were fleſhy and hardiſh.

The tranſlative ophthalmy, begins with a copious diſcharge of ſebaceous humor, of a yellowiſh white colour, and is known by the tumor, lividneſs, ſharp and launcing pain of the ſclerotica, the cornea, at the ſame time, being as it were depreſſed within a pit. It frequently follows ſoon after an injudicious ſtoppage of a gonorrhæa, the venereal virus being tranſlated into the eye. It has alſo been obſerved, that a gonorrhæa, which before ſeemed incurable, has, upon the coming on of this ophthalmy, ſuddenly vaniſhed; and in like manner the ophthalmy has gone off, upon the return of the gonorrhæa.

Sometimes a venereal ophthalmy has been produced by the immediate application of the virus to the eyes. *Van Swieten* relates the hiſtory of a young man, who having been uſed to waſh his eyes every morning with his urine, in order to ſtrengthen his eyes, continued the ſame cuſtom after he had contracted a gonorrhæa; in conſequence of which, a ſevere venereal ophthalmy quickly enſued. If from any circumcumſtance, the venereal virus gets upon the finger, and the eye ſhould ſoon after be rubbed with that finger, before the hands have been waſhed, it might alſo probably produce this ſpecies of ophthalmy. A ſurgeon of *Montpellier* laying down upon a pillow ſprinkled with venereal ſaliva, contracted this diſeaſe.

The venereal ophthalmy in general is ſubdued, and its poiſon extinguiſhed by mercury; but it ſhould never be applied to the eyes. The patient ſhould be bled and purged, and his eye waſhed continually with brandy and water, or a mixture of *Goulard*'s extract, with one hundred times the quantity of water. It is neceſſary alſo to evacuate the virulent matter, collected in the cellular texture of the ſclerotica and eyelids, by ſlight inciſions of each membrane: an ichor, very like that of a gonorrhæa, will be diſcharged.

C H A P. XV.

Phlyctenæ, or Veſications of the Cornea, and Conjunctive.

THESE are little ſuperficial bladders of water, like thoſe which are produced from a ſcald, or burn, ariſing on the cornea, or membrana conjunctiva: they are uſually about the ſize of a millet ſeed, but have been known to equal a filberd nut; and, when produced by a ſharp, corroding humor (as is moſt frequently the caſe) are accompanied with violent, darting pains. Upon taking a ſide view of theſe little bladders, they will be ſeen perfectly tranſparent; but if looked at in front, they will appear of the color of that part of the eye in which they happen to be ſeated.

Theſe veſications may be produced by any hot and acrid humor falling upon the eye, and thus they frequently appear in the ſmall pox, and meaſles. They are alſo excited by external cauſes, ſuch as the heat of the ſun, lighted ſubſtances, hot, ſharp, and corroſive liquors, inſects, or any other foreign body, capable by its carimony of raiſing a bliſter, getting into the eye.

They terminate either by reſolution, which is beſt, or by burſting withinſide, or by an external ulcer, which ſometimes widely corrodes the cornea. That the reſolution may be obtained, we are to make uſe of the general remedies for ophthalmies, ſuch as bleeding, a light thin diet, emollient fomentations, and purges. A decoction of elder flowers and linſeed, may be uſed as a fomentation: the puſtule ſubſiding, or the inflammation being abated, the reſolusion ſhould be attempted by the uſe of a collyrium, conſiſting of roſe-water, two ounces and a half, brandy one drachm, tutty and opium, of each a ſcruple, white vitriol two grains; or an infuſion of red roſe-leaves, with a ſmall quantity of white vitriol.

The white, and even the yellow of an egg, mixed with ſugar and ſaffron, and fomentations of melilot, vervain, rue, and red roſe decoctions are alſo proper to be uſed.

If notwithſtanding the uſe of theſe remedies, the puſtules ſtill remain, they ſhould be pierced with the point of a launcet; the fluid being then diſcharged, the ulcer is to be cured by ſuch means as are directed for the cure of ulcers of the cornea. Some indeed are for puncturing the veſications on their firſt appearance, without attempting to reſolve them.

CHAP.

CHAP. XVI.

Abſceſſes of the Cornea.

THESE are collections of matter, ſeated either between the lamellæ of the cornea tranſparens, or between the conjunctiva and cornea opaca. They are generally the conſequence of a chemoſis ophthalmy, and are accompanied with great head-ach, watching, weight over the orbit, fever, throbbing and dimneſs of ſight.

When the matter is lodged under the firſt, or outward lamella of the cornea, there appears a roundiſh, white, eminent ſpot, but when it is ſituated in the middle of the ſubſtance of the cornea, the tumor is flat and depreſſed; and when the complaint originates near the internal lamella of the cornea, there is frequently no tumor externally, the ſwelling being altogether within ſide. When the abſceſs is formed between the ſclerotica, and conjunctiva, the ſwelling is the only ſymptom, beſides the general ones of pain and inflammation, to point it out.

As ſoon as ever the exiſtence of matter is well aſcertained, a puncture ſhould be made in the moſt prominent part of the tumor, with either a launcet or a couching needle, and the matt erdiſcharged. When the cornea has been thus punctured, *Heiſter* recommends vipers fat to be dropped in, by which means, he ſays, the wound will be cleanſed and cloſed up, and the ſight ſometimes reſtored. But he however acknowledges, that when the matter lies deep in the cornea, the loſs of ſight is almoſt unavoidable.

CHAP. XVII.

Ulcers of the Cornea and Conjunctive.

THE eye, as well as every other part of the body, is liable from various cauſes to become ulcerated; and according to the different circumſtances and conditions of theſe ulcers authors have thought fit to beſtow different names on them: thus when the ulcer was hollow and narrow, they called it *Bothryon* when it was broader, but more ſuperficial, they gave it the appellation of *Cæloma*; when it deſcribed a portion of a circle, they termed it *Argemon*; when it was foul, and covered with a cruſt *Epicauma* or *Encauma.*

Theſe ulcers are uſually accompanied with an ophthalmy, impatience of light, cloudineſs of ſight and ſenſation of ſand or grits in the eye. The appearance of an ulcer in the cornea, and an ulcer in the conjunctive is ſomewhat different; the former reſembling a whitiſh point or ſpot, the latter having a reddiſh appearance.

The cauſes of this complaint are not only puſtules, abſceſſes, wounds and all ſolutions of the continuity of theſe parts, in general; but alſo all acrid and corroſive humors, which falling upon the glands of the eye, and on the eyelids, run and lodge upon the eye.

The firſt thing to be done for the cure of this diſorder, is, if poſſible, to remove the inflammation, and diſſipate the flux of humors which occaſion it. This point we are to endeavor to gain by bleeding, purging, pediluvia, bliſters, diet, ſweetners of the blood, and ſuch other remedies as are mentioned in the chapter on ophthalmies.

thalmies. Alſo if any turgid blood-veſſel be ſeen running upon the eye, and communicating with an ulcer, it ſhould be carefully divided with the point of a ſmall knife or launcet.

When the inflammation is gone off, and the eyes begin to dry up, the ulcers frequently get well of their own accord. It will greatly aſſiſt them however, ſays Mr. *Platner*, if *Woolhouſe*'s ointment be applied to the eye. This conſiſts of *Ærug Æris pp*, mixed up with freſh butter or ſoft axunge*.

If however the ulcers ſhould ſtill remain uncicatrized, we muſt make uſe of a ſolution of the lapis divinus of St. *Yves* in water, or an ointment made of white wax and freſh butter, with a little red precipitate in it, or mel roſarum, with a little mel ægytiacum added to it, or ſome other detergent medicament.

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* *Platner*'s method of applying any ointment to the eye, is by incloſing it in a piece of bladder, the open extremity of which is to be made faſt by a ligature : after that he perforates the bladder at its lower part, and then carrying it cloſe to the eye, he ſqueezes out the ointment through the hole or perforation into the eye.

When the diſeaſe is obſtinate, St. *Yves* recommends an infuſion of cloves, aloes, crocus metallorum and comphor in Spaniſh wine; a few drops of this, he ſays, being dropped into the eye three or four times in a day, will cicatrize the ulcers.

C H A P. XVIII.

Spots, Specks, and Opacities of the Cornea.

THESE are, moſt frequently, the conſequences of either inflammations, abſceſſes, or ulcers; and according to their depth, extent, and ſituation in regard to the pupil, are more or leſs injurious to viſion. Authors have divided this diſeaſe into two ſpecies; one, where the ſpot is thin and ſuperficial, which they call *Nebula*; the other, where it is thick and deep, which they name *Albugo*, and the Greeks *Leucoma*: this laſt is ſeldom curable.

If there ſhould be any ophthalmy, accompanying an opacity of the cornea, that muſt be firſt ſubdued. The remedies made uſe of, for the removal of the ſpot are mild cauſtics, and diſcutients, ſuch as vitriol, the juice of celandine, the gaul of fiſhes (particularly the Eel and the Pike) or birds of prey, vipers fat and crocus metallorum. *Platner* recommends a mixture of honey and ants, which has been baked, either by the heat of the ſun or in an oven. Whatever of this kind is applied, muſt be made ſo weak as not to excite any inflammation. If the complaint ſhould not give way, and any turgid vein be ſeen going from the conjunctive to the ſpot, we ſhould make no ſcruple of cautiouſly dividing it, with a ſmall knife, lancet, or ſcizzars. *Boerhaave* recommends alſo the repeated uſe of mercurial purgatives, to diſſolve the lymph, and by that means free the cornea from the ſpot.

Woolhouſe, in an albugo, accompanied with much moiſture, adviſes repeated ſuffumigations of aloes, myrrh, maſtich, and juniper-berries, ſprinkled on live coals, the warm ſmoak being conveyed to the eye through a funnel.

Mauchart adviſes the vapors of hyſſop, chervil, greater celandine, mother of thyme, marjoram, roſemary, juniper-berries, coffee, valerian root, maſtich, camphor, boiled in wine, water, or lime water; or let the eye be immerſed in an ophthalmic bath, conſiſting of a decoction of theſe.

Dr. *Mead* recommends a collyrium, compoſed of equal parts of common glaſs and white ſugar-candy, reduced to a very fine powder by trituration and lævigation; a little of this powder being blown through a quill into the eye every day, by its inciſive quality, he ſays, gradually abſterges and abrades the ſpot.

The opacity may ſometimes, when it is very ſuperficial, be pared off, with a very fine ſharp knife.

CHAP XIX.

Staphyloma.

THERE are two ſpecies of this diſeaſe: the firſt is a preternatural dilatation and elevation of the cornea tranſparens, and ſometimes of the ſclerotica, produced, according to St. *Yves*, by a corroſion or exulceration of ſome of the lamellæ of the cornea, whence being rendered weaker in that part, it gives way to the preſſure of the aqueous humor, and ſo projects externally: the ſecond is a tumor ſpringing out from the cornea, cauſed by the protruſion of the uvea through an aperture in the cornea, whether produced by a wound or other external or internal cauſe. There are ſeveral varieties of this diſeaſe, taking different names, according to the different figure and magnitude of the tumor: thus when it was thought to reſemble a grape, authors have given it the generic name of *ſtaphyloma*; when it bore a ſimilitude to the head of a fly, *myocephalum*; when like a nail, *elos*, or *clavus*, when reſembling a berry, *melon*; if like a pearl, *margarita*.

This diſeaſe produces not only deformity and blindneſs, but alſo frequently dreadful inflammations of the eyes, likewiſe pains of the head, ſleepleſſneſs, and ſuppurations, and thus not infrequently excites a cancer itſelf; ſo that every method of cure, for the moſt part, regards not ſo much the reſtoration and preſervation of the ſight, for that almoſt always periſhes, as the ſeaſonable remedying of the deformity, and ſubſequent evils abovementioned.

Whatever relates to the cure, muſt be ſuited to the figure, cauſes, and importance of the complaint. As ſoon as ever therefore any preternatural tumor of the cornea, or ſclerotica is perceived, we ought immediately to apply a compreſs dipped in alum water, a leaden plate, and bandage, or even ſome compreſſing inſtrument contrived for the purpoſe, that, by the help of theſe, the tumor may be repreſſed. But if the uvea is found fallen through an aperture of the cornea, whilſt the complaint is recent, it ſhould be immediately and dextrouſly returned by means of a ſmall probe; if the opening is too ſmall to admit of a return of the uvea, it muſt be enlarged with a ſmall curved knife: the patient ſhould be kept in a ſupine poſture, and proper remedies made uſe of. By theſe means ſight is ſometimes happily reſtored.

But if the complaint is inveterate, or does not yield to remedies, we muſt proceed to an operation for the removal of it. This the antients uſed to accompliſh by paſſing a needle, with a double thread through the middle of the tumor, and then taking the two ends of one thread they tied it above, and did the ſame with the others below, ſo tight as that the tumor ſhould gradually decay, and at laſt fall off. But this method being generally found to produce no ſlight pains, inflammations, and ſuppurations in the eye, *Heiſter* adviſes, as the ſafeſt and moſt expeditious remedy, to cut off the tumor.

St. *Yves* adviſes, when the tumor does not occupy the whole cornea, to paſs a crooked needle, threaded with ſilk through the middle of the ſtaphyloma, and then taking away the needle, and twiſting the two ſilken threads a little, to lay hold of them with the fingers of the left hand, and afterwards by means of a knife or launcet, to looſen the tumor a little beneath the thread, until we are able to thoroughly extirpate it by the ſciſſars: afterwards he orders ſpirits of wine, diluted with water, to be laid on the diſeaſed eye. For thus, not only the ſtaphyloma is removed, but the cornea alſo, is either entirely healed up, or only a very ſmall hole remains in the middle of the wound, through which the aqueous humor flows indeed in that proportion, in which it is ſecreted withinſide the eye, but however with hardly any inconvenience to the patient,

for

for it is gently carried with the tears by the lachrymal paſſages to the noſtrils.

But when the ſtaphyloma poſſeſſes the whole cornea, *Heiſter* adviſes the method of cure preſcribed by St. *Ives*, as the moſt expedient, in which not only the cornea itſelf, but alſo the uvea with about a line's breadth of the conjunctive is cut off. For then the humors are diſcharged from the eye, the eye is contracted into a leſſer form, and the wound itſelf is cloſed; which being done an artificial eye is inſerted, which ought not only to reſemble the other eye, but alſo to be exactly adapted to the afflicted part, by which means it will be moved here and there by the muſcles of the eye, in ſuch manner as not to be diſtinguiſhed from the true and ſound eye.

CHAP. XX.

Hypopion.

IT ſometimes happens that a purulent matter is found behind the cornea, in the place proper for the reception of the aqueous humor.

This affection is denominated by moſt phyſicians of this time, *Hypopium*, alſo *Pyoſis*. It is attended in the beginning with ſevere pains of the eye and head: and, if not relieved, a ſuppuration of the inſide of the eye, blindneſs, or even death itſelf, according to the degree of injury, gradually enſue.

It takes its riſe from an inward effuſion of blood, or formation of matter, after ſome violent inflammation, the ſmall pox, the operation for the cataract, or any very ſevere external injury of the eye.

If the quantity of blood or matter be ſmall, the firſt and mildeſt ſtep to be taken, is to try the effect of reſolvents; ſuch as fomentations made of ſage, eyebright hyſſop, and fennel-ſeed boiled in red wine; the patient ſhould alſo be bled in the jugular vain, and his body kept open. By theſe means, Mr. *Heiſter* ſays, he has known the eye, when dangerouſly affected, reſtored to its former vigor. If theſe remedies ſhould be found to avail any thing in the removal of the complaint, they ſhould be perſiſted in, until all the blood or matter is diſſipated: but if they ſhould prove

ineffectual,

ineffectual, and the pain, and other evils attendant upon this diſeaſe ſhould encreaſe, it will be neceſſary, in order to prevent the deſtruction of the eye, to cautiouſly open the cornea below the pupil, and about a line's breadth diſtant from the white of the eye, with the point of a lancet: if the noxious humor does not then flow out ſufficiently of itſelf, the eye is to be gently compreſſed and ſtroaked with the fingers, or, as St. *Ives* adviſes, ſome warm water may be injected through the opening with a ſmall ſyringe, which will waſh and carry out the offending matter along with it.

After all the heterogeneous is diſcharged, compreſſes dipped in a collyrium made of roſe or plantain water, and white of egg, or mucilage of quince ſeeds, with or without camphor, are to be applied, and kept conſtantly moiſt. In this manner, not only the wound in the cornea is quickly healed, but alſo the aqueous humor and ſight, unleſs the internal parts of the eye be much hurt, are ſometimes reſtored.

If ſome days after the evacuation of the matter there ſhould be a freſh extravaſation, which very frequently happens, the wound muſt be forced open with a very ſmall probe, and the matter diſcharged as at firſt.

There is another method of cure ſaid to be made uſe of formerly by *Juſtus*, a celebrated oculiſt in the time of *Galen.* His method was, to place the patient in a ſeat oppoſite to him: he then took hold of his head with both hands, which he ſtrongly ſhook and agitated, until the adventitious fluid entirely diſappeared; and what is remarkable, it is related by *Galen*, that the byſtanders could very clearly perceive the offending matter, to gradually ſubſide. *Heiſter* obſerves, that although ſome reject this method of cure as idle and ridiculous, yet he looks upon it as a very powerful remedy; and this not only from the authority of *Galen*, but from his own experience in the caſe of one, who being under his care for the cure of this diſorder, had occaſion to go a journey in a carriage, in the performance of which, he was remarkably ſhook and agitated; and in one day after his return, the purulent matter was intirely diſcuſſed. He therefore thinks it proper to try this means, previous to the performance of a chirurgical operation.

CHAP. XXI.

A Cloſure or filling up of the Pupil.

THERE are two ſpecies of this diſeaſe: one where the pupil is totally conſtringed or ſhut, and the lips of the uvea coaleſce; and this moſt frequently happens either from the birth, or after ſome violent inflammation of the eye: the ſecond, where the pupil is filled up by a cataract which adheres to the whole circumference of the iris.

The cure, if any, conſiſts in an operation invented by Mr. *Cheſelden*, the manner of performing which, Mr. *Sharp* deſcribes as follows. The patient muſt be placed as for couching, and the eye kept open and fixed by the *ſpeculum oculi*, which is abſolutely neceſſary here, ſince the flaccidity of the membrane from the iſſue of the aqueous humor, would take away its proper reſiſtance to the knife, and make it, inſtead of being cut through, tear from the *ligamentum ciliare:* then introducing the knife * in the ſame part of the *conjunctiva* you wound in couching, inſinuate it with its blade held horizontally, and the back of it towards you, between the *ligamentum ciliare* and circumference of the *iris*, into the anterior chamber of the eye, and after it is advanced to the farther ſide of it, make your inciſion quite through the membrane; and if the operation ſucceeds, it will upon wounding fly open, and appear a large orifice, though not ſo wide as it becomes afterwards.

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* The knife invented for this operation is ſomewhat like a couching needle, but cutting only on one ſide. See *Sharp*. Plate 10.

The place to be opened in the *irſis* will be according to the nature of the diſeaſe: if the membrane itſelf be only affected with a contraction, the middle part of it, which is the natural ſituation of the pupil, muſt be cut; but if there be a cataract, the inciſion muſt be made above or below the cataract, though I think it more eligible to do it above. Mr. *Sharp* * however adds, that the event of this operation is upon the whole very doubtful; and Mr. *Warner* ſays, he has never yet ſeen a ſingle inſtance of ſucceſs from it, and therefore cannot recommend it, as an adviſeable operation, under any circumſtance whatever. †

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* *Sharp*. p. 167, 8.

† *Warner*, on the eye, p. 84.

CHAP. XXII.

An Inflammation of the Choroid.

THIS is manifeſted by an inability to bear the light, a conſtriction of the pupil, weeping, and ſometimes a redneſs of the conjunctiva: to theſe are added obſtinate pains occupying half the head on that ſide where the diſeaſe is.

The cure is the ſame, as of the chemoſis ophthalmy.

CHAP. XXIII.

A Cataract.

A Cataract is defined to be an abolition of ſight, attended with a conſpicuous opacity behind the pupil, which loſing its natural black colour, becomes opake, and contracts colours foreign to it, ſuch as white, grey, yellow, blue or ferrugineous. In this caſe the *chryſtalline lens*, or its coverings, viz. either the *arachnoid* *coat* in which it is encloſed, or the *vitreous*, with which the bed of the vitreous humor, in which the lens is ſeated, is inveſted, which naturally ought to be tranſparent, being rendered opake, reflects all the rays of light, but tranſmits ſcarcely any; therefore, no image of objects can be painted on the *retina*, and the ſight thereof muſt be ſuppreſſed, by means of this obſtacle, although the retina and the other organs of ſight are in the beſt ſtate poſſible*.

The

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* We muſt not omit what *Heiſter* ſays; viz. that although the true, ordinary and moſt frequent cauſe of a cataract, is an opacity or obſcurity of the chryſtalline humor, yet that he is far from denying, but that it ſometimes, though rarely, is occaſioned by a preternatural membrane, or pellicle in the aqueous humor, of which he produces ſeveral inſtances; one of his own obſervation, another from *Lanciſi*, and others from other authors, *Palſin* reports, that ſince the diſpute on this ſubject, between *Woolhouſe* and *Heiſter*, many inſtances of the kind have been found, by different perſons, in human ſubjects: he enumerates above twenty, amongſt which he reckons three by *Winſlow*, three by *Lanciſi*, and ſix by *Geiſter*. *Morgagni* alſo cites *Mauchart* and *Zeller*, as having ſeen in each eye of a woman, a thin and blackiſh pellicle, placed before the pupil firmly adhering to the cornea, near its internal circumferance. Doctor *Mead* indeed adduces one inſtance (as a proof that a membranous cataract may exiſt) of a membranous tegument, ſpread over the pupil of an infant, which was injected,

and

The eye begins to be dim from a naſcent and recent cataract, ſo that the patient ſeems to perceive, as it were, a little cloud before it; this appears, from time to time, ſometimes faſter, at others more ſlowly, to grow thicker, and, at length, oppoſes itſelf ſo manifeſtly to the interior powers of ſight, as to be outwardly diſcernible to every one who looks at it. As the diſeaſe advances, the ſight becomes more and more dull, and at length is wholly loſt.

The ſame thing happens in a recent cataract, as to thoſe who look at objects through a very convex lens, viz. they only ſee diſtinctly, things near at hand, and placed at a determined diſtance; or the ſight is ſhortened from time to time. As the opacity of the ſpot, which at firſt repreſented a miſt or cloud placed in the bottom of the eye, increaſes by degrees, and tends gradually to a whiteneſs, it will appear to the oculiſt, on looking at it, to come nearer the cornea, or to be leſs deeply ſituated, as the ſame object ſeems to be placed nearer, becauſe it re-

and ſhewn to him by Doctor *Laurence*; but *Morgagni* has ſet this matter to rights, by obſerving, that it was nothing more than the *membrana pupillaris,* which not being ſufficiently known at that time, was taken for a preternatural and diſeaſed appearance.

flects more light; for the more that ſpot reflects the light, the leſs it tranſmits to the retina; therefore the ſight becomes gradually more obſcure in the cataract; and when the opacity ceaſes to increaſe, the cataract is ſaid to be mature or ripe; at which time the patients can indeed diſtinguiſh the ſolar light, but not the colours and figures of bodies.

There are alſo perſons afflicted with cataracts, who, on account of a conjunct fault of the retina, are, in the beginning, teazed with a ſuffuſion, or apparent viſion of flies, or threads ſuſpended in the air: but this ſuffuſion does by no means conſtantly accompany a cataract, nor ought it to be placed amongſt its ſigns; and they err, who ſuppoſe ſuch like appearances are to be deduced from imagined ſtreaks or opake points in the chryſtalline, whom *De Chales*, in his optics, juſtly derides: cataractous perſons, poſſeſſing a faultleſs retina, ſee objects involved, as it were, in an uniform miſt; but they ſee no diſtinct objects, or ſuch as are circumſcribed within certain limits fluttering in the air.

If the lens alone becomes opake, and is contracted, but the arachnoid coat be entire and pellucid, the perſon, in the beginning, ſees thoſe which are placed on one ſide of him, better than thoſe fronting him. He ſees alſo better at night and in the dark, in which the pupil is widened, than in the day time, and in a great light. But when the arachnoid coat is vitiated, it may be known, by examining into the firſt origin of it, and into the diſeaſe which brought it on; for it generally ariſes from inflammation, by which, though diſcuſſed, the ſight grows dull and dim much ſooner, ſo that in a ſhort time all viſion is loſt. In this kind of cataract, no ſenſation of light is left, nor can the perſon ſee better in the dark, although the pupil be dilated. The cataract itſelf, which is beheld within, is whitiſh, and as it were wrinkled.

The moſt frequent cauſe of a cataract, is a violent inflammation of the eye, ariſing either from ſome internal cauſe, or external violence, ſuch as a fall, blow or burn. Many have brought on themſelves a cataract, by frequent inſpection of the ſun or looking at a fire. *Fabricus Hildanus* relates a caſe of a cataract ariſing in one night's time from an inceſſant weeping for ſome days before.

The methods recommended for the relief of perſons ſuffering under this diſeaſe, may be conſidered as either *phyſical* or *chirurgical*. With regard to the former, Dr. *Buchan* ſays, that in a recent or beginning cataract, the ſame medicines are to be uſed as in a gutta ſerena, and that they will ſometimes ſucceed. He alſo affirms, that he has himſelf reſolved a recent cataract, by giving the patient frequent purges with calomel, keeping a poultice of freſh hemlock conſtantly upon the eye, and a perpetual bliſter upon the neck. *Platner* ſtrongly recommends the juice of live millepedes. *Sauvage* extols the white henbane as a ſpecific in this caſe *.

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* Uſus extracti hyoſcyami albi quotidianus, a triente grano incipiendo, & ſenſim augendo, quamdiu, nulla eſt œſophagi nariumve ſiccitas, eſt egregium & ferme unicum remedium quod cataractam reſoſolvat, ut pluribus obſervationibus compertum habeo. Preſbyter ea affectus in oculo dextro, poſt octo dies quibus hoc medicamine uſus eſt, quo intervallo, ad tria grana pervenit, jam minutos librorum characteres legere valet, qui prius non niſi maximos perſpiciebat; chryſtallinus, prius albus, jam ſubcæruleus evaſit & ſubpellucidus, ſuffuſio myodes qua laborabat evanuit, fames autem & ſomnus, prius languentes, vigent maxime. Ab hoc medicamine alium vidimus a *D. Coulas* etiam curatum, cujus chryſtallinus omnino diaphanus evaſit. *Savages* Tom. p. 724.

Chalibert aſſerts, that an infant cataract is ſuſceptible of being remedied by an aromatic ſpirituous compoſition, the ſtrength of which muſt be proportioned to the degree of the malady. *Boerhaave* alſo recommends, as the beſt topical application, the vapor of ſome mild ſpirit conveyed to the eye. But what bids the faireſt for ſucceſs, is the electric fluid conveyed in a ſtream to the eye, which certainly proves more powerfully diſcutient, than any other application whatever.

The chirurgical helps conſiſt of two operations. In one of them, a needle is introduced into the eye, behind the uvea, and the diſeaſed chryſtalline preſſed downwards, and hid in the bottom part of the vitreous humor: this is called the operation by Couching or Depreſſion. In the other mode of operating the cornea is inciſed, and the cataract taken quite out of the eye, and this is called the operation by Extraction.

But before we proceed to any operation for the removal of the cataract, it will be neceſſary to inform ourſelves of the following particulars, viz. whether there be any opacity of the cornea or conſiderable adheſion of the uvea to the diſeaſed chryſtalline,

talline, or whether the patient be unable to diſtinguiſh light from darkneſs, as either of theſe circumſtances would be a ſufficient objection to the operation. The method of aſcertaining an adheſion of the uvea to the cataract, is to ſhut the patient's eye, and rub the lids a little; then opening it ſuddenly, you will perceive the pupil contract, if the chryſtalline humor does not prevent its action, by its adheſion. The operation would alſo be unadviſeable, if the eye is waſted, or grown larger than it naturally was. Cataracts are of various colors, and though thoſe of other colors frequently ſucceed very happily, yet the pearl coloured, and thoſe of the color of burniſhed iron, are reckoned to endure the needle beſt. Cataracts that enſue from external injuries, as blows, wounds, or punctures, are frequently irremediable, as the other parts of the eye are often too much injured to afford any proſpect of ſucceſs from the removal of the cataract. With regard to children, it is better to wait till they arrive at a reaſonable age, as they are not ſufficiently obedient or tranquil for the performance of the operation. In like manner as to adults; thoſe who are troubled with a cough, coryza, catarrh or vomiting, it is better to remove theſe diſorders before we proceed to the operation, leſt the ſurgeon ſhould be diſturbed at the time of performing it, and on account of other inconveniences that might otherwiſe enſue.

Of the operation by depreſſion.

When none of the objections abovemened exiſt, the operation by couching or depreſſion may be performed in the following manner. Having placed your patient in a convenient light, and in a chair ſuitable to the height of that you yourſelf ſit in, let a pillow or two be placed behind his back, in ſuch a manner, that the body bending forward, the head may approach near to you, then inclining the head a little backward upon the breaſt of your aſſiſtant, and covering the other eye ſo as to prevent its rolling, let the aſſiſtant lift up the ſuperior eyelid, and yourſelf depreſs a little the inferior one; this done, reſting your elbow upon your knee, or (which keeps the hand much ſteadier) a table of a convenient height, placed on the ſide of your patient, and your lower fingers upon his cheek, deſire him to look ſtedfaſtly towards his noſtrils, and then ſtrike the needle through the tunica conjunctiva, ſomething leſs than one tenth of an inch from the cornea, even with the middle of the pupil, into the poſterior chamber, and gently endeavor to depreſs the cataract with the flat ſurface of it. If it ſhould not readily ſubmit, Mr. *Warner* directs the needle to be carefully moved underneath the cataract, and gently raiſed up, by which means the cataract may be ſeparated from the proceſſus ciliares, and aranea below, and at the ſame time be diſengaged from the inferior portion of the iris, ſuppoſing it to be ſlightly connected with that membrane, which cannot always be foreſeen: after the cataract is thus lifted up, the poſition of the couching needle muſt be altered, and directed a little above the upper portion of the circle of the pupil, afterwards inclining the inſtrument downwards and obliquely outwards; at the ſame time taking great care not to wound the iris, or the proceſſus ciliares, leſt a diſcharge of blood ſhould enſue, ſufficiently great to render the aqueous humor opake, and embarraſs the operator By theſe means Mr. *Warner* ſays, the cataract will be ſo effectually diſlodged from the bed of the vitreous humor, and its nutrient veſſels be ſo perfectly deſtroyed, as to bring on its gradual decay.

If after it is diſlodged, it riſes again, tho' not with much elaſticity, it muſt again and again be puſhed down. If it is membranous, after the diſcharge of the fluid, the pellicle muſt be more broke and depreſſed: if it is uniformly fluid, or exceedingly elaſtic, we muſt not continue to endanger a terrible inflammation by a vain attempt to ſucceed. If a cataract of the right eye is to be couched, and the ſurgeon cannot uſe his left hand ſo dextrouſly as his right, he may place himſelf behind the patient, and uſe his right-hand.

It is ſaid, that the cataract ſometimes paſſes through the pupil, and gets into the anterior chamber of the eye, in which caſe the lower part of the cornea is ordered to be divided, and the cataract extracted. Though the neceſſity of this may be juſtly called in queſtion, ſince Mr. *Pott* has proved by repeated experiments, that the lens in that ſituation, will conſtantly diſſolve.

The cataract is liable to riſe again after it has been depreſſed, but though an unlucky circumſtance, yet Mr. *Warner* obſerves there is this conſolation, that the operation may very ſafely be repeated, and with a good proſpect of ſucceſs, unleſs ſome uncommon phænomenon ſhould occur to forbid it. And notwithſtanding it ſometimes happens that the cataract cannot be depreſſed with the needle in the operation; it muſt not, he ſays, be concluded from thence that the operation will certainly be unſucceſsful: for it does ſometimes turn out contrary to expectation, that the cataract gradually ſubſides in conſequence of the violence done to the capſule of the chryſtalline humor and its nutrient veſſels, as well as on account of its removal from its bed in the vitreous humor, and the patient is happily reſtored to ſight.

It is not uncommon with travelling operators to preſent objects to their patients for them to diſtinguiſh, immediately after the depreſſion has been attempted, in order to aſcertain the ſucceſs of the operation. But this is carefully avoided by the more ſkilful and learned of the profeſſion, as any exertion of the diſeaſed and debilitated eye would tend to heighten the conſequent inflammation, and might induce a return of the cataract. It is better therefore when the operation is finiſhed, immediately to apply ſome cooling repellent remedy, and likewiſe to cover both eyes with a bandage, altho' one only ſhould have been operated upon, leſt upon any motion or diſturbance of the ſound eye, the other ſhould obey its motions. He is then to be carried into a dark chamber, as the admiſſion of any rays of light would too violently irritate the retina, and there to be laid in his bed, upon his back, ſupporting his back and head with pillows, ſo as to preſerve them in nearly an erect poſition. He is to be kept quiet and ſtill, abſtaining from the harder foods that require much chawing, as likewiſe from earneſt converſation, laughter, and any thing that might excite coughing or ſneezing, inaſmuch as theſe unſeaſonable motions of the head might occaſion a reaſcenſion of the cataract. Preſently after the operation, the patient ſhould be bled, which ſhould be repeated according to the inflammation and ſtrength of the patient, and glyſters ſhould be occaſionally adminiſtered. A vomiting not unfrequently enſues from this operation, for which, if it continues, an opiate ſhould be given, which will ſometimes remove it. During the inflammatory ſtate, warm fomentations ſhould be applied to the eyelids, either with a bit of fine rag or a ſpunge, and where the reſtleſſneſs is conſiderable, anodynes ſhould be given internally.

In this manner, and at the ſame time, obſerving a ſtrict regimen as to diet, we are to perſiſt ſo long as any pain or inflammation remain. When the inflammation is removed we may admit the light, but it muſt be in the moſt gradual manner, letting in but a very ſmall quantity at firſt, and encreaſing it afterwards by degrees, as the patient can bear it. If a weakneſs and waterineſs of the eye ſhould continue, cold ſpring water with a third part brandy, or aq. ſapphirina lowered with common water may be uſed to advantage.

EXPLANATION OF PLATE I.

This plate contains the human eye and two couching needles, as repreſented by Mr. *Warner*; alſo a figure, ſhewing the manner in which a cataract obſtructs the paſſage of the light, taken from Mr. *Cheſelden*'s anatomy.

Fig. 1.

A. The couching needle.

Fig. 2.

B. The couching needle paſſed into the eye, with its blade lying on the cataract.

C. The eye.

D. The *cornea*.

E. The anterior chamber of the eye.
F. The *iris.*
G. G. The poſterior chamber of the eye.
H. H. The *proceſſus ciliares*, or poſterior *lamina* of the *iris.*
I. The *chryſtalline* lens or humor.
1. The *ſclerotica.*
2. The external *lamina* of the *choroides*,
3. The internal *lamina* of the *choroides.*
4. The *tunica retina.*
5. The oblique inſertion of the *optic nerve.*

All that ſpace betwixt the internal ſurface of the *cornea* and the *iris* is called the anterior chamber of the eye,

All that ſpace betwixt the *iris* and the *chryſtalline* lens is called the poſterior chamber of the eye. Both theſe ſpaces are naturally filled with the *aqueous* humor of the eye.

That part of the eye behind the chryſtalline is filled with the *vitreous* humor, which on its anterior part forms a bed for containing the poſterior part or more convex ſurface of the chryſtalline lens.

Fig. 3.

Shews how a cataract *a.* will obſtruct the light *b. c. d.* which is before it; and how ſome ſide light *e. f. g. h. i. k.* may paſs to the retina

through

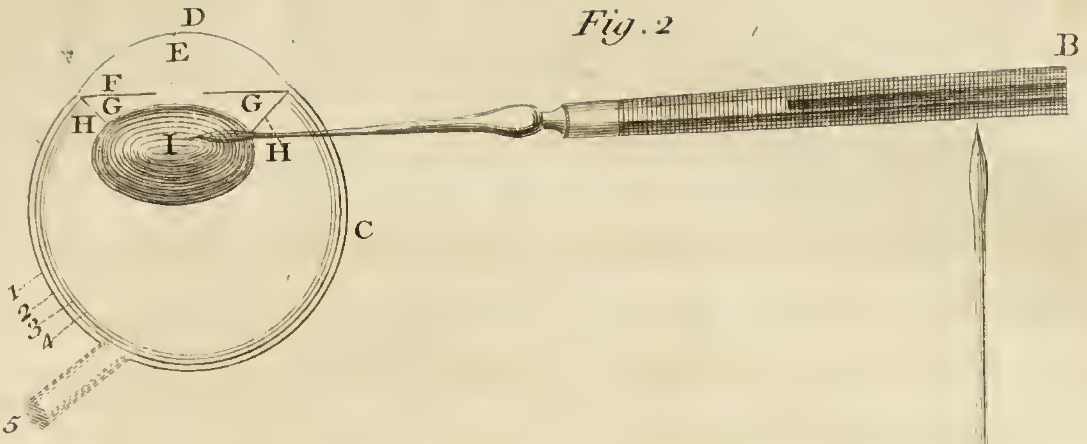


Fig. 2

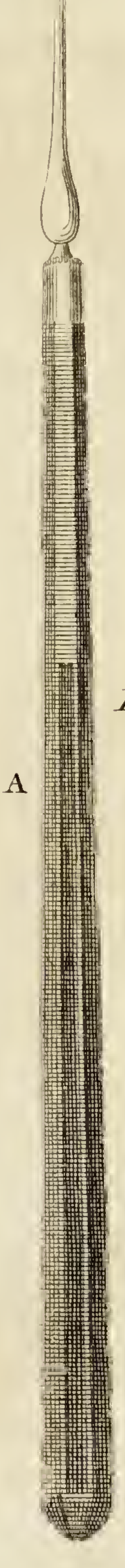


Fig. 1

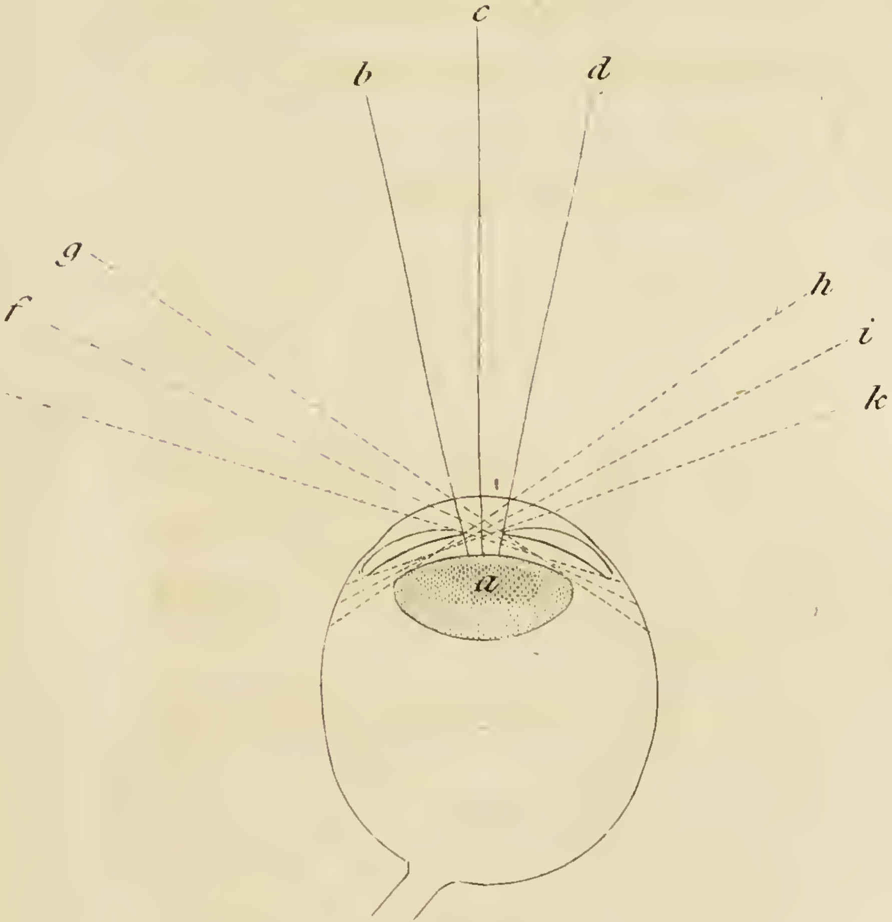


Fig. 3

through the aqueous humor, but not being brought into a focus, gives only a ſenſe of light without viſion.

The manner of extracting the Cataract, as deſcribed by Mr. Warner.

The manner in which this operation may be performed is as follows. The patient being ſeated upon a large trunk, or box, the operator places himſelf exactly oppoſite, upon a ſeat of a convenient height, and in a room where the light is moderate, that the pupil may not be too much contracted.

This being done, an aſſiſtant ſtands behind the patient, who puts his right-hand under the patient's chin, after having covered the right-eye, ſuppoſing it to be the left, which is to be operated upon: the aſſiſtant then places the back part of the patient's head on his breaſt, at the ſame time directing the face upwards, to prevent the ſudden diſcharge of the vitreous humor. He afterwards lifts up the ſuperior eyelid with two or more of his fingers, taking care not to preſs upon the globe of the eye above: the operator at the ſame time depreſſes the inferior eyelid, with this precaution, not to preſs upon the inferior part of the globe of the eye till the inciſion is made. The patient muſt look ſtraight forwards, and a little upwards. The operator now fixes his right elbow upon his right knee; after having put his right foot firmly on the patient's ſeat for this purpoſe. He then ſuddenly and reſolutely introduces the point of his knife through the external part of the cornea, oppoſite to the center of the pupil, directing it horizontally betwixt the anterior ſurface of the iris, and the interior ſurface of the cornea, into the fore chamber of the eye, till it penetrates through the cornea on its oppoſite ſide; when the inferior part of the cornea muſt be ſuddenly divided, by directing the blade of the knife downwards, and outwards. The larger and lower the inciſion is made, the better will the operation be likely to ſucceed; and if it happens, that the wound thro' the cornea proves too ſmall, it muſt be enlarged by a pair of ſharp ſciſſars, well poliſhed; the blade of which muſt be curved, ſo that they may have a convex and concave ſurface.

The next proceſs of the operation is to wound the aranea. This ought not to be attempted till a few minutes after the cornea has been inciſed: as ſoon as the inciſion is made through the cornea, the eyelids ſhould be ſet looſe. By paying a proper attention to theſe maxims, the whole of the aqueous humor will be evacuated; the iris will become flaccid and ſubſide upon the cataract: the pupil will be dilated, and the inſtrument for cutting thro' the capſula, may then readily be directed under the flap of the cornea to the inferior edge of the pupil. From theſe precautions the pupil will eſcape violence: to which it is very liable from the paſſage of the cataract through it, when contracted and ſmall. Immediately after the membrane is wounded, the globe of the eye muſt be preſſed gently upwards, that the cataract may be ſqueezed thro' the pupil and inferior part of the cornea, where the inciſion has been made. The cataract being thus removed, the eyelids muſt be covered with a ſoft double or triple rag, dipped in a cold ſolution of ſaccharum ſaturni, or the pulvis ceruſſa comp. prepared in damaſk roſe water, or ſpring water: this application muſt be kept on with a ſoft linen roller, and renewed two or three times a day. The patient muſt be laid on his back upon a bed or couch; and in this ſituation he muſt keep himſelf for ſome days, that the wound made through the cornea may heal, and the newly ſecreted aqueous humour may be prevented from eſcaping out of the eye.

During the inflammatory ſtate, the eye ſhould be treated with emollient fomentations and the patient's body muſt be kept open: opiates likewiſe muſt occaſionally be adminiſtred.

EXPLANATION OF PLATE II.

This plate contains the inſtruments employed by Mr. *Warner* in the extraction of the cataract; as alſo the knife uſed by Mr. *Sharp* for the ſame purpoſe.

Fig. 1. The eye with Mr. *Warner*'s knife paſſed thro' the cornea.

Fig. 3. The eye with the wound on the inferior part of the cornea, with the inſtrument paſſed under the cornea, and lying upon the iris, for dividing the aranea.

Fig. 4. The cataract.

Fig. 1.

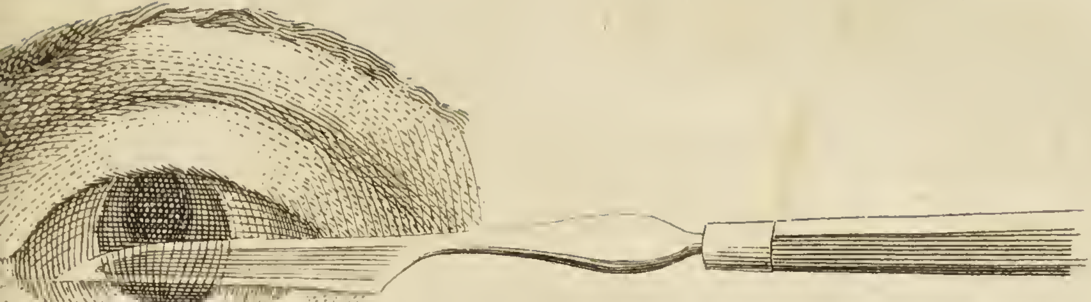


Fig. 2.

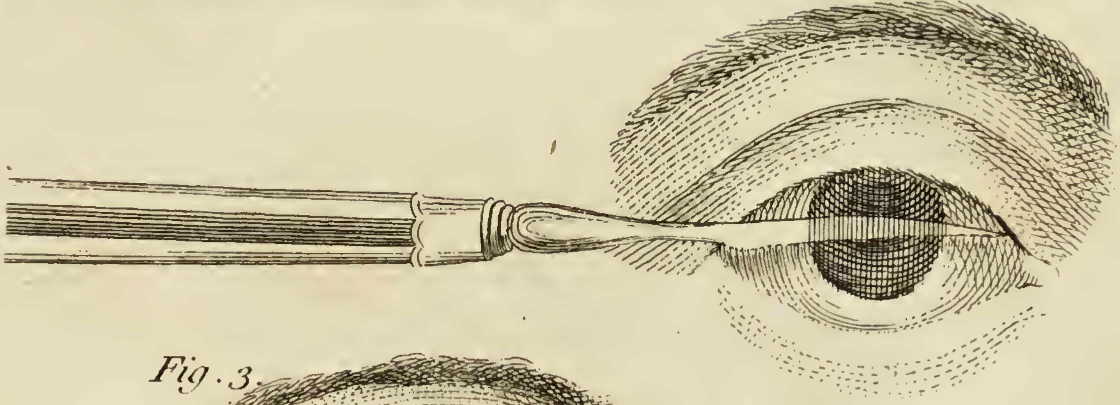
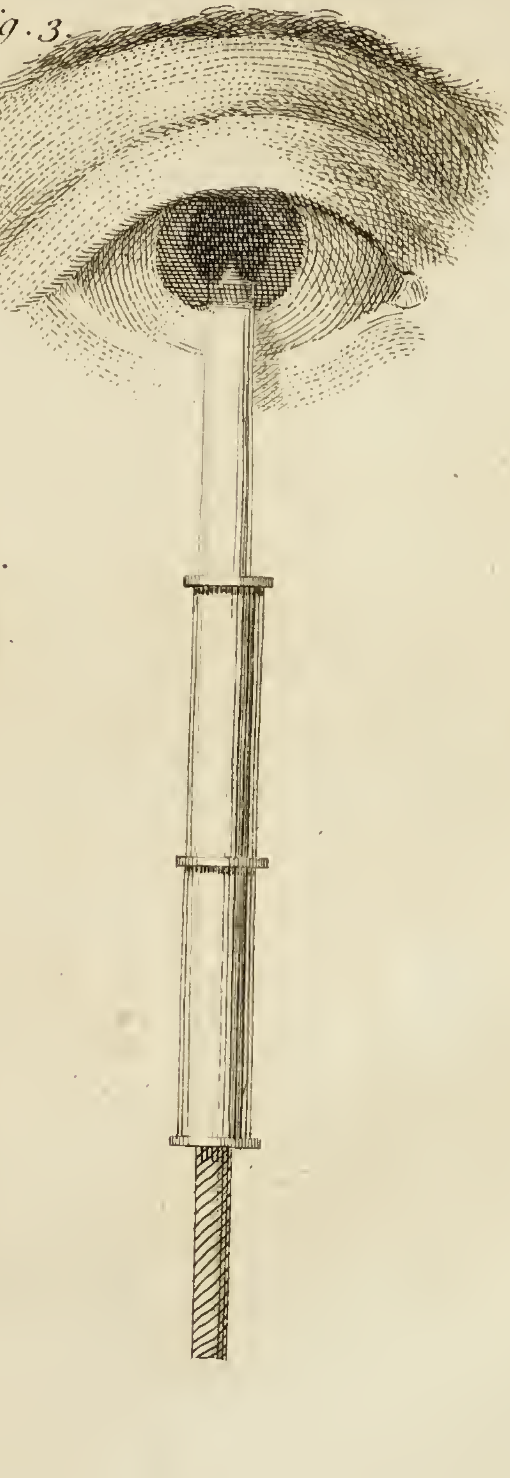


Fig. 3.



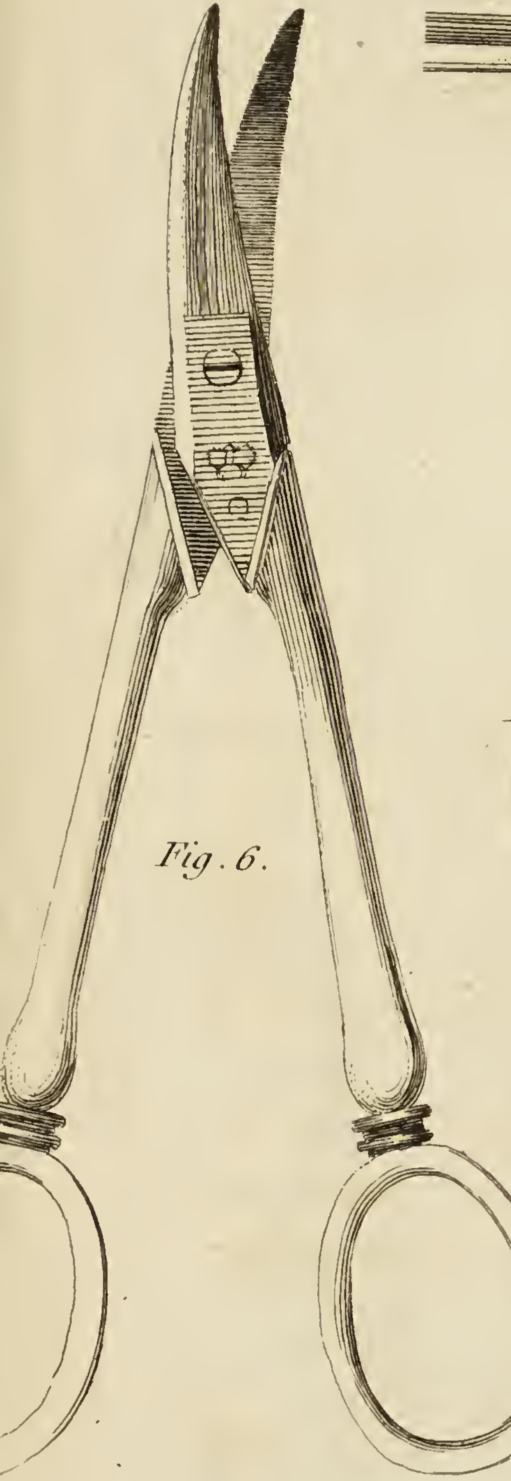


Fig. 6.

Fig. 4.

Fig. 5.

Fig. 5. The inſtrument for dividing the aranea with the point of the lancet out of its caſe.

Fig. 6. The curved ſciſſars for enlarging the wound of the cornea.

CHAP. XXIV.

A Gutta Serena.

THIS is a diſeaſe the chief ſymptom of which, is a ſuppreſſion of ſight, accompanied with an immoveableneſs of the pupil, without any ſenſible opacity of the eyes.

The principle of a gutta ſerena is either in the brain, at the thalamus nervorum opticorum, or in the paſſage of theſe nerves, or in the whole of the retina, occaſioning a total inſenſibility of the eye to the rays of light.

If the ſound eye be ſhut, and the blind one preſented to the light, the pupil is not only not conſtringed, but is ſometimes dilated, and this is the only motion which remains, and indicates a perfect gutta ſerena.

Though in moſt ſpecies of the gutta ſerena, the pupil is open, nay dilated and immoveable, yet ſometimes this diſeaſe is accompanied with a myoſis or permanent and preternatural conſtriction of the pupil.

When a gutta ſerena accompanies or follows apoplexy or palſy, it indicates the uſe of cathartics, emetics, bliſters, ſetons, and iſſues in the neck. As a topical application, the vapor of ſpirit of wine received by the eyes, has been much recommended; but of this claſs, by far the moſt powerful and certain is the electric fluid, conveyed in a proper manner to the eye.

Sometimes this diſeaſe proceeds from pregnancy, acute fevers, ſuppreſſion of the menſes, or piles, or a plethora from what cauſe ſoever, and then it is accompanied with the ſymptoms of a plethora. The patient complains of a violent and deep ſeated pain of the head, or a painful weight in the bottom of the eye. Several have been cured by opening the frontal vein, and permitting the blood to flow, until it ſtopped of its own accord: it has availed not unfrequently to open the jugular vein. Bleeding from the foot and medicines exciting the menſes, are praiſed by St. *Yves*, who directs viper broths, millepedes and opthalmic waters to be afterwards uſed.

Infants are alſo ſometimes born blind, which however is only known as they grow older. It is ſingular in this ſpecies, that the pupil although immoveable, is not more open, than it is at that age, in thoſe who ſee perfectly.

A gutta ſerena happens ſometimes from a ſynchyſis, which is a confuſion or mixture of the diſſolved vitreous with the aqueous humor. This begins with internal, ſevere, and very obſtinate pains of the eye, accompanied with head ach, or hemicrania, watching, fever and ſometimes a preternatural diſtenſion or fulneſs of the globe: the ſight is alſo darkened. These pains ſometimes continue for ſeveral months, nay whole years, when at length the ſight is entirely aboliſhed. This ſpecies of gutta ſerena is incurable.

But it often happens that ſome time after the ſight of one eye has been loſt in this manner, the other eye becomes inflamed, and affected with ſimilar ſymptoms, and is in imminent danger of the like misfortune, which St. *Yves* preſumes might be avoided, by extirpating the blind eye. This extirpation of the eye, or exciſion of the cornea with the efflux of the vitreous and chryſtalline humors, is by no means free from danger, and an incurable hemicrania, and even madneſs have been known to enſue from it.

There is another ſpecies ariſing from eruptive diſeaſes either repelled or retained. Among theſe may be placed that gutta ſerena, which depends upon an acrimony of the humors, in which therefore gentle laxatives, bathings, acidulated waters, diluent, ſudorific and diuretic ptizans are praiſed. St. *Yves* mentions a gutta ſerena ariſing from a ſuppreſſed herpes of the face, which was removed on reſtoring the herpes, by opening and ſudorific drinks, ptizans, &c.

This diſeaſe has alſo been produced by wounds, concuſſions of the eye and head, tumors ſituated upon and compreſſing any part of the optic nerve, as alſo by the epilepſy, convulſions, lues venerea, too free uſe of narcotics, ſudden acceſs of a ſtrong light and temporarily by intermittent fevers, and the hyſteria.

CHAP. XXV.

Dropſy of the Eye.

THIS diſeaſe is owing to an encreaſe, ſometimes of the aqueous, ſometimes of the vitreous humor, and ſometimes to both.

The ſigns of a preternatural accumulation of the aqueous humor are; a ſucceſſive encreaſe of the bulb of the eye, with a turgid tenſion and protuſion of it from the orbit, ſo that the eyelids cannot at all, or with difficulty cover it; the cornea is preternaturally elevated and prominent; the iris deeper, and more remote from the internal ſuperficies of the cornea; the pupil immoveable, in ſome caſes dilated, in others contracted: (the moveableneſs and magnitude of the pupil remain unaltered according to *M. Jan.*) The ſight which was faultleſs at the beginning, becomes ſucceſſively weaker, and more obſcure; at firſt a mild blunt pain is felt about the bottom of the eye, which afterwards becomes more violent; this is accompanied with a hemicrania of the ſame affected ſide, a ſtupor of the parts of the face, and ſometimes an emphyſema, tooth-ach, and ſleepleſſneſs. At laſt, when the bulk of the eye is ſtill farther encreaſed, an epiphora and ectropium ſupervene.

This complaint is cauſed by an obſtruction in the abſorbent veſſels, which may be the conſequence of long inflammations, eſpecially of the cornea, violent blows, or the application of too detergent or drying collyria.

The ſigns of a ſerous turgeſcence of the vitreous humor are; a pain in the forehead, and one or both eyes; the pain being removed, or abating, the globe of the eye appears ſomewhat larger, and more eminent; the chryſtalline is forced forwards; the pupil is unuſually dilated, and contracts but very little, and with great difficulty when expoſed to a ſtrong light; the ſight is ſo obſcured, that the patients can hardly diſtinguiſh objects,

jects, or the light, and cannot therefore ſafely walk by themſelves. In general theſe accidents attack both eyes, either at the ſame time, or a little while afterwards.

The prominence of the eye is leſs perceptible when the iris is black, and when both eyes are equally affected; but in thoſe who have blue, white, or grey eyes, and well opened, and when only one eye is affected, it is more eaſily obſerved. With proper aſſiſtance the greater part of thoſe afflicted with this complaint, recover their ſight, though not in ſo perfect a manner as before.

Perſons of a melancholic and atrabilarious temperament, are ſometimes afflicted with this diſeaſe of the vitreous humor: but thoſe who are the moſt liable to it, are, women after the firſt or ſecond month of their pregnancy, in whom it continues till they are delivered, and virgins with obſtructed menſes, whom it afflicts for four or five months. It alſo ſometimes happens to men after a ſuppreſſion of the hæmorhoids.

This diſeaſe at firſt is difficulty diſtinguiſhed from an incipient common cataract: but afterwards when no opacity of the chryſtalline comes on, and the ſight is in ſome meaſure reſtored, it may be diſtinguiſhed from other diſeaſes.

St. *Yves* denies that this complaint proceeds from a preternatural enlargement of the vitreous humor, and likewiſe ſays, he could never find the globe of the eye bigger, or any way different from its natural ſtate. He ranks it as a ſpecies of gutta ſerena, and thinks it is produced by a depoſition of ſome humor upon the optic nerves, which by compreſſing them, brings on this diſeaſe.

The diagnoſis of a preternatural accumulation of the aqueous humor, combined with an encreaſe of the vitreous, is more difficult, though it is not of any great conſequence as to the cure. However it may be gueſſed at, from the too great bulk of the globe of the eye, increaſing rapidly, and it's remarkable hardneſs; from the ſquinting; great dilatation of the pupil; deep ſituation of the iris, and great projection of the cornea. It is owing ſometimes to a ſharper, ſometimes to a milder ſerum pouring down upon the eye:

in the firſt caſe, beſides the ſymptoms juſt related, it is accompanied with an internal and external inflammation, fever, and ſleepleſsneſs, which are wanting in the latter caſe.

The cure of a dropſy of the eye conſiſts of, bleedings in the arm, neck, foot, or even from the temporal artery, as the violence of the pain, and the degree of plethora require; bliſters applied to the neck, or behind the ears; an iſſue made in the back part of the head, and kept open for ſeveral months; purges, and mercurial hydragogues; diaphoretics and reſolvent fomentations.

If theſe remedies ſhould prove ineffectual, and the diſeaſe ſhould originate from an exceſſive quantity of the aqueous humor, a puncture muſt be made, with a lancet or very ſmall trocar, behind the iris, in the place where the couching needle is introduced, into the anterior chamber, and the humor evacuated; after which a compreſs dipped in ſome cooling collyrium is to be firſt applied, and over that a piece of ſheet lead, and a bandage, in order, if poſſible, to moderate the rediſtenſion of the eye. When the water accumulates again, and the eye returns to its former magnitude, the operation muſt be performed again, and repeated, until the eye remains of its natural ſize. *Nuck* relates an inſtance where he was obliged to make the puncture five times, and at laſt ſucceeded, the eye remaining of its proper magnitude.

But if the natural figure and ſight of the eye are entirely deſtroyed, and the pain, and other bad ſymptoms encreaſe, the only reſource we have left, is to inciſe the cornea and diſcharge all the humors; and if, notwithſtanding this, the eye ſhall yet remain ſo big, that the eyelids cannot conveniently cloſe over it, a portion of it muſt be taken off, in the ſame manner as was directed in the ſtaphyloma, after which the wound is to be healed, and an artificial eye may be inſerted.

CHAP. XXVI.

Abſceſs of the Eye.

THE preceding diſeaſe terminates in this; if the inflammation brought on by a ſharper ſerum inundating the eye, goes into ſuppuration. After terrible pains, inflammation encreaſed both within and without, great tumefaction of the membranes forming the white of the eye, everſion of the eyelids, hot and ſharp tears, the eye at laſt becomes troubled, and there happens a ſuppuration and deſtruction of the internal parts. After ſome time, the cornea tranſparens ulcerates, and breaks, and the matter flows out: this is followed by a diminution of the pains, ſucceſſive cleanſing of the parts, leſſening of the globe of the eye, and at laſt a cicatrix.

The method of cure during the inflammatory ſtate, has been already deſcribed in the foregoing chapter. The treatment, when the inflammation has terminated in ſuppuration, is as follows. As ſoon as ever matter is known to be formed, or even before it is thoroughly formed, if the inflammation ſhould be very great, and the pains exceſſive, the cornea is to be opened with the point of a launcet, in that part where the matter points; or, if the matter ſeems to affect no part particularly, in ſome depending part: the matter being then evacuated, and the eye cleanſed by abſtergent collyria, a cicatrix is at laſt induced. By this means we prevent the greater pains ariſing by the procraſtination of the burſting when left to itſelf.

CHAP. XXVII.

Cancer of the Eye.

A Thick blood ſtuffs up the veſſels of the membranes of the eye, and renders them very thick, and, as it were, fleſhy: the inflammation and pain at the beginning is moderate, but they gradually encreaſe as the diſeaſe advances; ſight is deſtroyed.

A diſeaſe of this ſort is terrible indeed; it is, a cancer of the membranes of the eye; which, although ſometimes it is not ulcerated, yet nevertheleſs occaſions dreadful pains, accompanied with a fever, and at laſt death. Neither health nor life can be preſerved but by the extirpation of the eye alone *.

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* A very remarkable caſe of a cancer of the eye, attended with ſome extraordinary circumſtances, is related by Mr. *Hayes* in the third volume of the Medical Obſervations and Enquiries, p. 120. A very terrible caſe of this ſort is alſo to be met with in *Fabricius Hildanus*, *Centur.* x. Obſerv. 1.

FINIS.